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Electrical Contracting

With Which Is Consolidated
Electrical Record

Perseverance Brings Its Own Reward

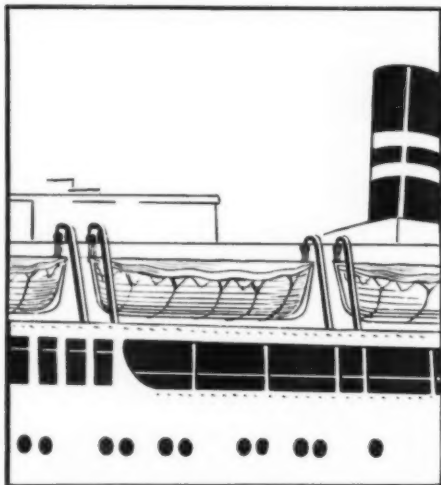
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The electrical construction industry—contractor, supplier and manufacturer—has persevered during the four most trying years in its history. The reward will start to come in 1934.

Therefore the publishers of ELECTRICAL CONTRACTING rejoice with its readers and advertisers in the turn of business and take this opportunity to pledge to them the best efforts of the publication towards the hastening of complete business recovery.



• D E C E M B E R • 1 9 3 3 •



Fuses

.. Like Lifeboats .. Must Be Right when Needed

A lifeboat is hung on its davit with the hope that it will never be called upon to do more than hang there. A fuse is placed in its clip with the hope it will never be called upon to act as the last barrier to destructive overload. But crises do happen. Protective devices must be right.

Fuses look simple. But fuses that really protect must be the product of infinite care—in their manufacture, in their design. Jefferson (Union) Fuses have 40 years of such care behind them. Since the beginning of electricity as a usable tool, Jefferson Fuses have been giving the sure, accurate protection you expect.

Offer your customers the same *proven protection* that so many leading plants secure by standardizing on Jefferson Fuses.

Jefferson Electric Company
Bellwood (Suburb of Chicago) Illinois



Jefferson knife-blade type. Simple—only three units. Rugged—withstands repeated blowouts. Saves time—only one loose end-cap, studs need not be removed—only loosened.

JEFFERSON UNION RENEWABLE FUSES



VOLUME 33
NUMBER 2

electrical contracting

WITH WHICH IS CONSOLIDATED ELECTRICAL RECORD

S. B. WILLIAMS, EDITOR AND GENERAL MANAGER

PUBLISHED MONTHLY

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a NEW and Fertile Field

FOR *Electrical Contractors*

... OFFERS IMMEDIATE PROFITS!

"There has come into existence in the past twenty years a very important group in the electrical contracting industry—the industrial contractor."

MR. D. B. CLAYTON, *President*
Southeastern Industrial Chapter N. E. C. A.

NEVER WAS OPPORTUNITY GREATER FOR ELECTRICAL CONTRACTORS TO ESTABLISH THEMSELVES IN THE INDUSTRIAL FIELD!

THREE years of forced economy have eliminated or greatly reduced the maintenance crews in industrial plants.

As a result, the revival of industry finds the electrical equipment in many plants in deplorable condition.

Factory executives are faced with the problem of replacing worn-out, obsolete and neglected equipment.

They are ready to listen to any plan which will reduce costs and maintenance expense.

This new and fertile field that promises new profits is wide open to electrical contractors. The demand is there waiting for your initiative and knowledge of electrical requirements.

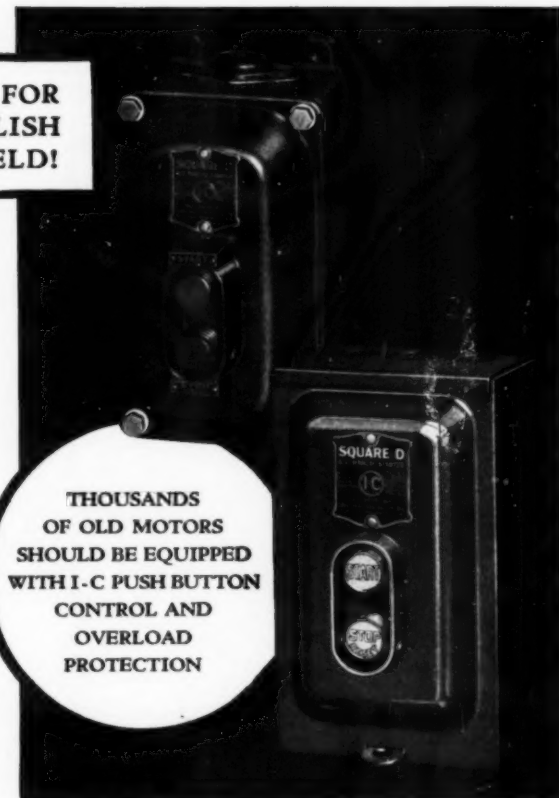
Square D will gladly help you. At our district offices in all principal cities, we maintain electrical engineers, trained in the application of motor control, power distribution and industrial wiring.



SQUARE D COMPANY

INDUSTRIAL CONTROLLER DIVISION
MILWAUKEE, WISCONSIN, U. S. A.

BRANCH SALES OFFICES IN ALL PRINCIPAL CITIES



PUSH button control and overload protection are requirements of any modern motor installation.

The top illustration shows the Class 2510 A. C. Manual Push Button Starter, with a dust- and water-tight cast iron enclosure.

The lower illustration shows the same starter with standard steel cabinet.

Replacement

THE way out of this depression as with every previous one lies in the creation of a market for capital goods—goods that require capital and not an operating expense outlay. In this classification fall electrical equipment and construction material.

THERE are two ways in which capital goods can be moved—by expansion and by replacement. The former method was used during the period from 1921 to 1929. The latter looks like the probable way for the next four years.

There will undoubtedly be a certain expansion market in 1934 but this will come, according to present indications, largely from public works construction and new residential building.

The real opportunity, however, seems to lie in the replacement or modernization market. This market is by no means confined to industrial plants but goes into commercial buildings and the home as well.

There are two aspects to the replacement market of interest to the electrical industry—reinspection and modernization.

Reinspection does not have to be a forced proposition, it can be sold to the American people. It is capable of producing upwards of \$100,000,000 worth of electrical work (including materials) a year.

Modernization involves the replacement of old equipment to secure greater economies or more effective operation. Under a price stabilization program such as N. R. A. is bringing to bear it is becoming more obvious every day that cost economies must be introduced into the manufacture of American products. It is also true that as rentals increase tenants are going to prefer the modern office buildings unless the older buildings offer some exceptionally attractive low rates. The same is true of apartment houses, hotels and residences.

NEITHER reinspection nor modernization is a market that will come of its own accord. Both have to be developed and sold and since replacement is the one definite way that we see at the

present time to build business, how are we to go about it?

Replacement in a way is somewhat new to the electrical industry because being, after all, a comparatively young industry we have very largely confined our efforts so far to introducing and extending electrical service.

Nevertheless, our electrical manufacturers have been busy year after year bringing out new lines and improving the old. It is realized, of course, that a lot of development work has merely been an attempt to keep pace with competition. Nevertheless, there have been in the past fifteen years a great many radical improvements in electrical equipment and supplies.

Surely these improvements can be translated into economy and efficiency, to greater safety, to better production, to greater ease and flexibility of operation. These are facts that the industry must know.

A CERTAIN amount of electrical replacement business will come from the modernization activities of other capital goods industries, but we must not be willing to depend entirely on that. There is besides a great replacement opportunity of electrical equipment only.

Modernization runs to lighting equipment, motors and control, circuits and circuit control, signalling equipment, wiring adequacy, drives, heating equipment, ventilation, etc.

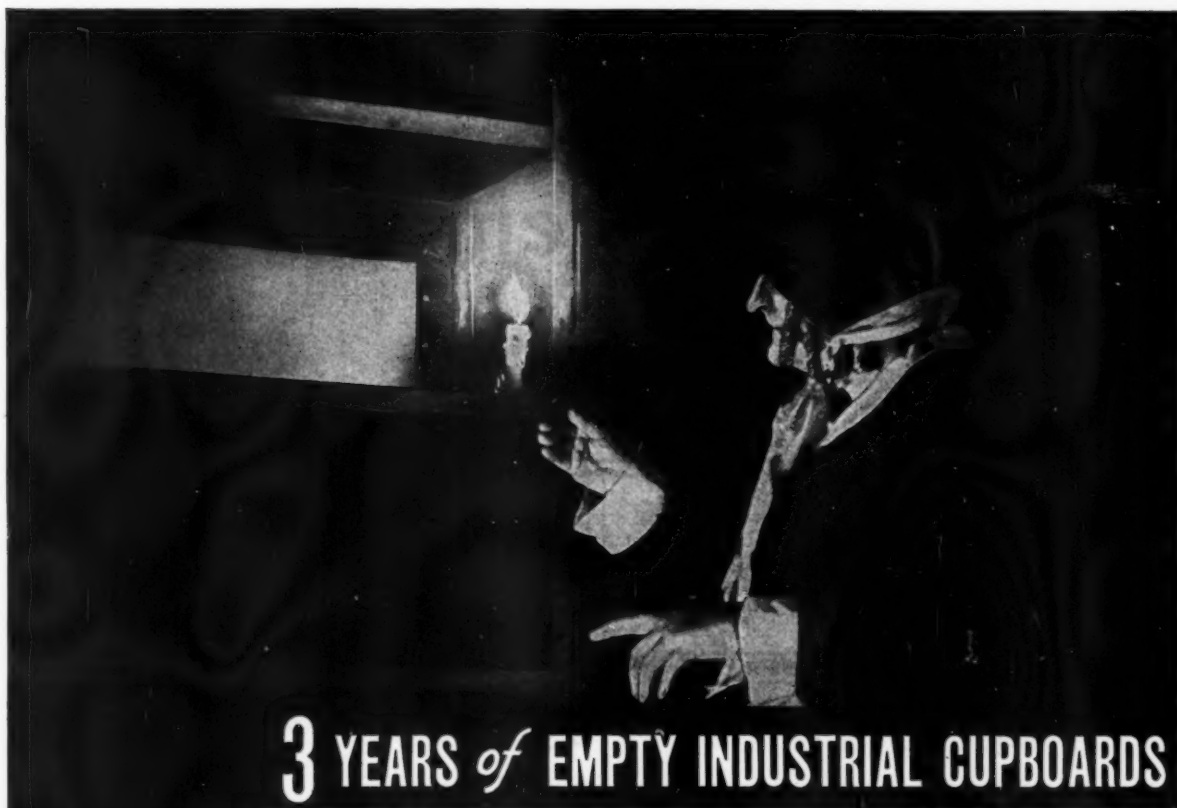
Thus it will be seen that there is not a manufacturer of an electrical commodity that is not in some way effected by replacements.

It offers electrical contractors an opportunity for new business, but they cannot develop the business alone. They must be assisted by the manufacturers with effective selling aids and data.

It offers the wholesalers an added outlet for equipment and supplies.

It provides better and more satisfied customers for the utilities.

The replacement market offers the electrical industry a quicker way out of the depression than waiting for the expansion market which might or might not come within the next two or three years.



3 YEARS of EMPTY INDUSTRIAL CUPBOARDS

...have built you an enormous market!

Since 1930, Industry has been "doing without." It has done without new equipment . . . supplies . . . even maintenance items that are positively necessary. Its cupboards are empty.

Today, the President is mobilizing Industry for action. Men are going back to work. Wheels are turning . . .

The years of skimmed buying have created an enormous vacuum. That vacuum in turn has created an enormous market for alert electrical contractors. It means a *new opportunity* to sell better signalling, lighting, motors and control. More adequate wiring. For example:

Signalling...Adequate signalling equipment saves time and money. Lowers cost . . .Hence—signal call, interior telephone systems, watchmen's calls, tank alarms and other signalling equipment *can be sold today* if you survey your prospects and *plan* a real sales effort.

Lighting...4 out of 5 industrial plants are logical prospects. 12,000 industrial plants were recently surveyed. 54 per cent *had obsolete equipment*. Another 25 per cent had modern equipment, *but inadequate intensities*. How many of these are in your sales area? List them. *Plan* a sales campaign. Concentrate—*Sell!*

Motors and Control...New motors and new control are needed in unusual numbers to meet increased production schedules. Find out where they're needed.

Wiring Supplies... Recovery will require modernization . . . re-wiring . . . eventual expansion. Wiring supplies from Graybar are *dependable*. Dependable work makes satisfied customers...future sales.

PLAN. Map out your "recovery territory." Plan. Sell! *Get your full share of the new business. Mail coupon.*

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EXECUTIVE OFFICES, GRAYBAR BLDG., N. Y.

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Gentlemen: Please send me information on a "Planned Sales Effort for More Industrial Business", and specific facts on your equipment checked below:		
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<input type="checkbox"/> Motors and Control	<input type="checkbox"/> Wiring Supplies	
NAME.....		
ADDRESS.....		
CITY..... STATE.....		

VOLUME 33
NUMBER 2

electrical contracting

WITH WHICH IS CONSOLIDATED ELECTRICAL RECORD

DECEMBER
1933

SO IT WAS IN CHARLEMAGNE'S TIME

BY JOHN WISE



It was in the ninth century and Charlemagne had just finished the very creditable job of putting Humpty-Dumpty together again. Figuratively speaking, he picked Europe up, dusted her off, put

new weapons in her hands and new armor on her back. With sledge-hammer blows, he had crushed the spoilers and restored order among the nations.

Instead of abusing the absolute power acquired through his victories, he used it to hasten the return of normal conditions, profitable trade and decent living for the masses. Although stern rules were laid down, he encouraged individuality and initiative by creating a string of buffer states, with charters of liberty and a free hand to operate according to local conditions.

In spite of this wise handling of a bad situation, nothing much happened. Though the people were more cheerful, they sat tight and trade remained almost stagnant. Hurt and disappointed Charlemagne acted

swiftly. Through the land he sent emissaries, backed by picked battalions, to learn the truth.

Everywhere the answer was the same. "We are afraid!" said the rulers, "The Moors are overrunning Spain and knocking at our

gates. We must hoard our money and conserve our armies until things get better." Then Beauchamp, Chief Envoy, lost his temper. "Things will never get better while you sit fear-ridden and idle," read his manifesto, "The Emperor's conquests have given you security, and his work shall not be wasted. Up and out, all of you! Buy and sell freely; show your wares abroad; send out your commissioners for trade; get back to your fields and your forges, *we* will take care of the Moors!"

I claim that we contractors are suffering from the same conditions that gave old Charlemagne and his brain trust insomnia after they thought everything was Jake. We may not be idle, but we have that out-on-a-limb feeling, because the fears of the past are still with us. If the mountain won't come to us, let's go to the mountain.

A central trade-promotion organization? Why not? It would not have to spend a lot of money, but it could locate saleable markets—and work up selling plans and ideas. The boys will fall in line behind a concerted movement for business as never before. Every contractor and every local organization, at some time or other, has engaged in a campaign of sales visits, phone calls, circularization and co-operate advertising. The difference would be that all of us would be doing the same thing all at once, and I can just picture the astonishing results of such a drive now, when the purse-strings are popping right and left.

Who's afraid of the big, bad Moors?

Christmas Lighting

COMMERCIAL



Interiors as well as exteriors can be treated. This simple use of electric candles and lighted festoons is effective.

Inexpensive festooning can be very effective.



The season's greetings to the car driver done in this fashion should more than pay for itself in extra business. Wreaths, trees and festoons, all lighted, are used.

Decorative Suggestions

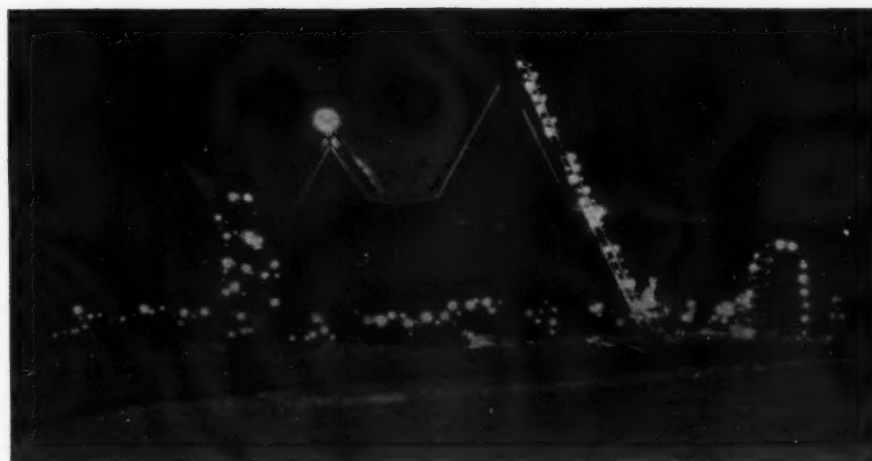
RESIDENTIAL



The floodlighted home presents a cheery atmosphere to all who pass.

Simple cut-out figures can be used to portray symbolic events.

A suggested lighting treatment for the medium sized house. The use of the regular Christmas tree strings makes possible the creation of a striking display.



Wiring to Suit the Job Saves \$328

By James P. Warner
Consulting Engineer
Pittsburgh, Pa.

THE application of modern equipment and a revived method of wiring saved \$328.00 for the owners of a large warehouse recently erected at Mansfield, Ohio. The saving was the result of combining light and power systems and using the main and tap method of distribution.

The building, used by the Westinghouse Electric and Manufacturing Company for the storing, handling and shipping of refrigerators, ranges and other household appliances, consists of three high aisles

with a traveling crane and conveyor in each. The power requirements were five 2 H.P. unit heaters, three cranes with a load of 20.5 H.P. each, and three 1 H.P. conveyors; four light, deep bowl reflectors with 500 watt lamps were used over the storage area and 1000 watt lamps over the shipping area.

The system as installed is 115-200 volt, 3-phase, 4-wire with single-phase branch lighting circuits. The service enters underground at the main distribution panel shown in Fig.

1, and feeders are run underground to panels G-13 and D-13. From each panel a main is run either along the wall or on the conveyor structure east and west, so that there is a main along each of three rows of columns almost the full length of the building. Junction boxes are inserted in these mains at every second or third column where a circuit breaker is installed to control and protect a lighting circuit. At some junction boxes a second circuit breaker is installed in the same box to control and protect a convenience outlet installed below it. Circuit breakers for motor circuits are also fed from junction boxes nearest the motor location. Lighting circuits are carried up columns from circuit breakers to ceiling lighting units and motor circuits are carried from circuit breakers directly to motor switches or starters. Crane circuits are carried up from the panelboards to the trolley directly above.

Both the feeders and branch circuits are heavier than are commonly required, due to the large floor area of the building as shown in Fig. 1, and because the height from floor to ceiling is approximately 50 ft. The maximum voltage drop at any lamp is approximately 3 volts.

While the building was in the preliminary plan stage a layout was made in the conventional manner as shown in Fig. 2, distributing from panelboards built up of circuit breakers. The services used were 115-230 volt, 3-wire, single-phase for light, and 220 volt, 3-phase for power. This original layout gave the Hatfield Electric Company, who was the electrical contractor, an opportunity to make a comparison of costs of the two methods. The results are shown in the table.

Aside from the saving in dollars, the owner obtains the following advantages from the use of the main and tap system:

1. The control of light is near where it is used.

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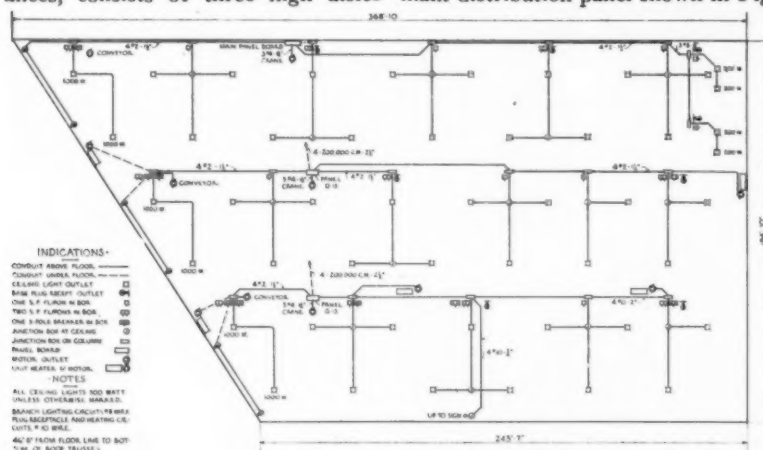


Fig. 1—Layout Employing the Main and Tap System of Distribution.

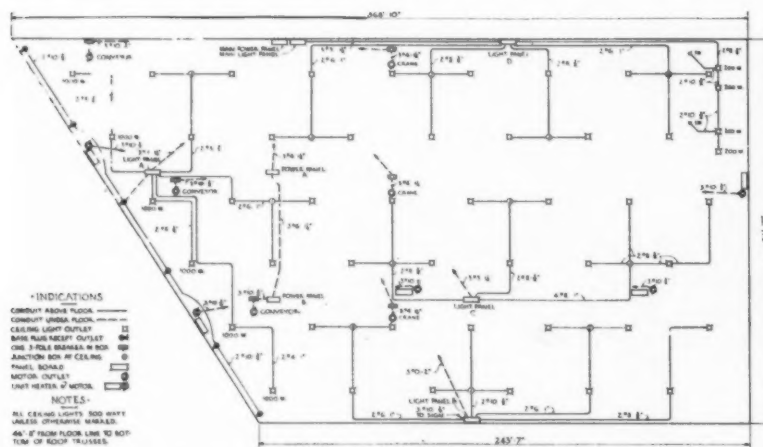


Fig. 2—Layout According to the Conventional System.

COMPARISON OF ESTIMATED COSTS

	Main and Tap System Cost in Dollars	Panelboard System Cost in Dollars	Savings on Main and Tap System in Dollars	Saving in Per Cent
Main and distribution panels with power circuit breakers and lighting circuit breakers in small cabinets.....	\$ 538.00	\$ 630.00	\$ 92.00	14.5%
Conduit, wire, wiring devices, reflectors, lamps and all labor	3,783.00	4,019.00	236.00	5.9%
Total	\$4,321.00	\$4,649.00	\$328.00	7.1%

2. Additional circuits for light, convenience outlets or motor with their circuit breakers for protection may be

as short as the building conditions permit.

The main and tap wiring system permits the use of No. 8 wire for branch circuits because they are short and allows the energy to be carried more nearly to the point of utilization in the large feeders or mains, also a greater diversity of load is obtained, resulting in a smaller voltage drop.

The panelboards are broken up into small units and the circuit breakers are placed as near to the lamps as practicable, where they are most convenient for use. In effect, the panelboard buses are extended in the form of mains reaching along the three rows of columns and feeding circuit breakers through junction boxes.

An objection that might be raised to the use of a combined light and power system is that the starting current of the motors may cause enough drop in voltage to make the lamps



Fig. 5—Main Panelboard for Light and Power. The two lower breakers feed Panels D-13 and G-13, upper left breaker feeds crane trolley, upper right breaker feeds mains to east and west.

flicker. By test, the maximum starting current taken by a crane motor causes a voltage drop of only 0.75 volt on any lighting circuit and the starting of a heater motor causes a drop of 1.5 volts on the same circuit. These drops are not considered objectionable for warehouse occupancy.

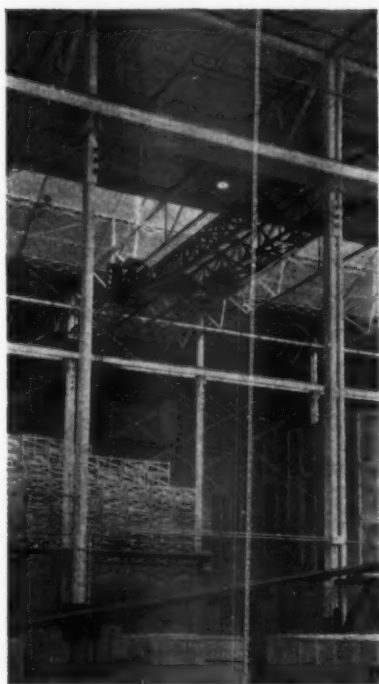


Fig. 4—Crane and Conveyor Panel G-13.

added at any junction box, and the circuit runs required are short due to frequent placement of junction boxes.

The chief economy of distribution shown by the main and tap system was obtained by combining the light and power system on a 3-phase system rather than distributing most of the energy, which was for lighting, on a 3-wire single-phase system, and by eliminating the use of parallel paths as shown in Fig. 2. It may be noted in Fig. 1 that the number of parallel feeders is reduced to a minimum, that there are no branch circuits parallel to feeders, mains or other branch circuits, and that the branch circuits are

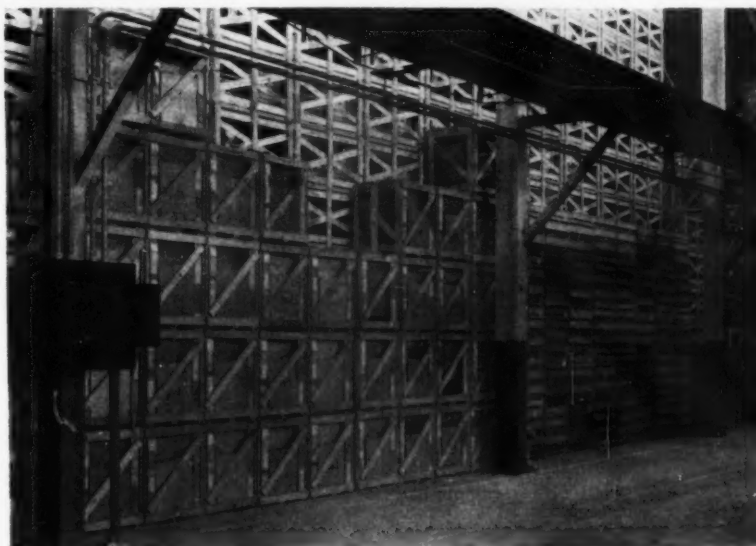


Fig. 3—Panel D-13. Breaker on left is for crane trolley feed. Other breakers on right are for mains to east and west. On farthest column there are two flipons, one controlling a lighting circuit and one controlling a convenience outlet.

Explosion Proof Wiring—III

General Requirements for Apparatus

and

Wiring for Class I Locations

By C. W. Gustafson,

Chairman, Article 32 Committee, N.E.C.

EARLY in the development of apparatus for Class I locations it was found that it was a practical impossibility to construct apparatus which was vapor tight, that is, so constructed that vapor would not enter the enclosing case. The alternate heating and cooling of the air within enclosures such as switch cases, conduit systems, motor cases and the like results in an unbalancing of pressures to such an extent that the vapor or gas is forced through even the most minute openings. This phenomena is usually referred to as "breathing." Assuming, therefore, that the vapor or gas will enter the conduit or other parts of the enclosing systems, it can be expected that the mixture of vapor or gas and air within will explode. With this in mind, it is apparent that conduit joints and fittings, motor and controller cases, and other enclosures must be so designed as to prevent the emission of flame or hot gases, as well as to withstand the pressures developed within the enclosing system in event of such explosion. Should flame or hot gases be permitted to issue from the enclosure it is clear that any explosive mixture surrounding it would be ignited. It is this which it is desired to avoid and represents the standard to which Class I apparatus is constructed. Hence, in the various rules for Class I locations we find the term "explosion-proof" used which is defined in Article I (Definitions) as follows:

Explosion proof means enclosed in a case which is designed and constructed to withstand an explosion of a specified gas or dust which may occur within it, and to prevent the ignition of the specified gas or dust surrounding the enclosure, by sparks, flashes or explosions of the specified gas or dust which may occur within the enclosure.

The term "vapor-proof" which is often heard and used with reference to apparatus intended for Class I locations is somewhat meaningless in that connection and should not be used.

Underwriters' Laboratories have written standards for the construction of the various types of electrical apparatus for Class I locations and have developed test procedures to determine the value of devices submitted for listing. In general, the standards prescribe first, certain minimums of strength of the enclosing case and its fastenings to resist the explosion pressure and second, that joints, operating shaft openings and fastening openings be of such design as to prevent the emission of flame or hot gases. The first requirement is clearly met by providing a case or enclosure having sufficient strength of wall and fastenings, while the second can be accomplished by providing flanged covers of sufficient width or sleeves of sufficient length to cool the gases or extinguish the flames before they reach the exterior.

Four Groups

Due to the fact that the various gases and vapors have varying degrees of hazard with regard to explosion pressures and other factors, it was found by the Laboratories that it was desirable to divide Class I into four groups in accordance with their degree of hazard, as follows:

Group A — Atmospheres containing acetylene.

Group B — Atmospheres containing hydrogen.

Group C — Atmospheres containing ethyl ether vapor.

Group D — Atmospheres containing the vapors of gasoline; common petroleum, ethyl alcohol, methyl alcohol, acetone and lacquer solvents.

In Underwriters' Laboratories' published Electrical List the various devices are listed in accordance with the above. It should be pointed out that a motor, for instance, listed for a Group D atmosphere is not approved for a Group A, B or C atmosphere; but a Group C motor, or one listed for Group A or B may be used in a Group D atmosphere. This grouping was instituted for economic reasons.

In the testing of devices actual conditions are reproduced as closely as possible. Mixtures of vapor gas and air at various points over the explosive range are introduced into the interior of the device which is placed in an explosion box containing a similar mixture. The mixture within the enclosure of the device is then ignited and if the mixture in the explosion box is not ignited it is evidence that flame did not propagate from the interior of the enclosure of the device to the surrounding explosive atmosphere. Necessarily, a number of such tests must be made using various concentrations of vapor or gas and air to establish the worst conditions.

Type of Wiring

It is imperative that the type of wiring employed for Class I locations be the safest available. The rules provide that, "Rigid conduit with explosion proof joints and fittings shall be employed as the type of wiring." Rigid conduit provides:

- (1) Effective protection against mechanical injury to the conductors.

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- (2) A low resistance equipment grounding circuit.
- (3) Reasonable protection against possible arcs burning through the conduit wall.
- (4) Explosion-proof threaded joints or couplings.

Tests have shown that joints in approved rigid conduit with five full threads engaged are explosion proof. Running threads which must necessarily be deeply cut resulting in a rather loose joint, should not be permitted.

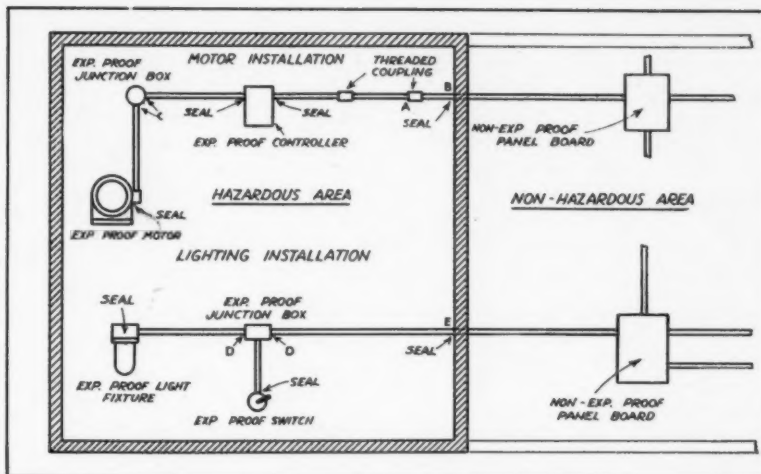
It will be found that permission is given in Class I rules to employ an approved flexible fitting of the explosion proof type where it is necessary, as at motor terminals. This is a concession to necessity. We understand that a suitable fitting will shortly be announced. Its use will be limited to those motor installations where it is necessary to shift the motor on its base or where the motion of the motor, as in some types of dry cleaning machinery, renders rigid connection impracticable.

Having provided an explosion proof conduit system it is equally important that fittings, such as outlet boxes, ells, and others, also be explosion proof. Ordinary fittings are not suitable, for should an explosion occur in the conduit, flame or hot gases would undoubtedly issue through the joints of the fitting and ignite the surrounding explosive mixture. Complete varieties of explosion-proof fittings for every conceivable purpose are now available.

Sealing

To prevent the propagation of an explosion from a switch enclosure, motor case or the like into the conduit systems, or where a conduit leads from a hazardous to a non-hazardous location, the rules require that the conduit be sealed off by a sealing compound approved for the purpose which is not affected by the surrounding atmosphere or liquids, and which has a melting point of not less than 200 deg. F. This sealing compound shall have a thickness of not less than $\frac{5}{8}$ in. in the sealing well or fitting.

This provision for sealing off conduit runs at motor, terminal boxes, switch boxes and similar places was inserted in the rule for two reasons. Recognizing that the conduit system, controller cases, motors, and other



Simple Diagrammatic Illustration of Code Requirements for Sealing: The area enclosed by the cross-hatched border is intended to represent a hazardous location while that to the right represents an adjoining non-hazardous location. The upper illustration shows a simple motor installation with the points where sealing is required designated by the word "seal." The seal at the motor is made by the manufacturer as this is required by the Underwriters' Laboratories' Standard. The seal at point "B" should be beyond the last coupling or fitting in the hazardous area as otherwise vapor or gas would enter the conduit system and pass into the non-hazardous area. If the coupling "A" is located as to prevent installation of a sealing fitting at that point the sealing fitting may be installed in the non-hazardous area but ahead of the first non-explosion proof device or fitting. Sealing at points "C" is recommended where convenient especially where conduit runs are long in order that the volume or gas subject to one explosion be reduced.

In the simple lighting installation shown in the lower part of the illustration the necessary sealing is indicated as above. The seal in the lighting fixture is made by the manufacturer. The same comments as above apply to sealing at point "E" where the conduit leaves the hazardous area. Sealing at points "D" is recommended for the same reasons as given in the foregoing.

enclosures are not vapor-tight, the "breathing action" would cause the vapors or gases, mixed with air, to enter the enclosing system where the mixture might be ignited by an arc from a motor controller, a spark from a motor or an arc in the wiring. As the first consideration it is desirable to eliminate the amount of vapor or gas present in an enclosing system subject to a single source of ignition by sealing off the conduit at the points mentioned and so break it up into a series of individual enclosures. This is especially important at motor controllers, switches, and commutator type motors where sources of ignition are present in normal operation, but it is recommended that it be done at all fittings and outlet boxes, whether containing normally arcing or sparking parts or not. The second consideration involves the tendency of vapors and gases to diffuse. Assuming the presence of an explosive mixture in the

conduit, it would be most undesirable that this mixture be permitted to flow through the conduit to a point beyond the hazardous area to a service switch, for instance, which being in a non-hazardous area would be permitted to be of the ordinary enclosed type. It is reasonable to believe that under some conditions a sufficient amount of an explosive mixture of vapor or gas and air would accumulate in this service switch to cause an explosion when the switch was operated. The switch box not being designed to withstand such explosion pressures would most likely burst, causing injury or fire.

In the accompanying illustration there is shown diagrammatically the points at which sealing is required in a typical installation.

Some manufacturers have so designed their Class I equipment to facilitate sealing by providing small wells into which the sealing compound can be poured or pressed after

the conductors are in place. There are available also specially designed sealing fittings for this purpose. Suitable sealing compounds have been developed and placed on the market which resist the solvent action of most vapors and liquids and which will not soften or crack in use. A mixture of litharge and glycerine has been found satisfactory for use in gasoline vapor atmosphere.

Service Equipment, Panelboards, and Switchboards

It is extremely desirable that all service equipment, panelboards, and switchboards be located outside of the hazardous area. In the case of an establishment such as an oil refinery where the major portion of the premises may be classed as hazardous, this equipment is best located in a separate building outside of the hazardous area, or one so built and located that explosive vapors or gases will not be present in it in dangerous quantities.

In other instances where only a small part of the area is classed as hazardous, the service equipment can usually readily be placed in an adjoining room or building in which the hazardous condition will not be present. As an illustration, in a dry cleaning establishment, the service equipment and panelboards may be placed in an addition to the main building but cut off from it by an unpierced fire wall. This room may then also be used to contain remote type motor controllers, in itself a valuable economic consideration in that ordinary non-explosion proof equipment may be used.

In some instances, however, it becomes necessary to provide for the installation of panelboards within a hazardous area and then it is required that they be of the approved explosion proof type. There is now available at least one such panelboard which has been listed by Underwriters' Laboratories. This particular panelboard employs circuit breakers which may be reset without opening the case, an important factor as will be pointed out later.

Fuses and Circuit Breakers

The rules for Class I locations permit the installation of fuses in the hazardous area provided they are installed in explosion-proof enclosures and, further, that the fuse cutout bases and their enclosures shall be approved as unit devices for use in

explosive atmospheres. There is a definite relationship between a fuse of a given capacity and enclosure designed to contain it, hence the need for unit approval. An important consideration in the question of permitting fuses in a Class I location is the need for opening the enclosure for the replacement of fuses. This objection might be overcome by designing some type of interlocking feature which will disconnect the circuit automatically when the case is opened, but to date such an assembly has not appeared. Because of this factor, circuit breakers in explosion-proof enclosures are to be preferred. Approved explosion-proof circuit breakers of several designs are now readily available and all of these may be reset, when tripped, without opening the enclosing case.

Motors

From our point of view there are two general types of motors; first, those having commutators, slip rings or other sparking parts; and second, squirrel cage induction motors. Although motors of the first type are more hazardous than the second when operating in a hazardous atmosphere, it was deemed necessary to require that all motors be of types approved for operation under the particular conditions to which they will be exposed. A motor, to be considered safe for operation in Class I locations must necessarily, be so designed that whether in normal operation or in case of a fault, such as a burn-out, it will not cause ignition of the hazardous material outside of the motors. To fill this specification, a motor of the explosion-proof type is required and only those which have been subjected to rigid tests and properly identified should be accepted. Except in the case of fractional horsepower motors, all motors are equipped with explosion-proof terminal boxes and the leads from this box into the motor are sealed as required by Class I rules. Fractional horsepower motors are often not supplied with terminal boxes because they might be sold to the manufacturers of devices such as gasoline pumps, who complete the assembly.

In some instances it may be desired or necessary to isolate a motor from the hazardous area and thus make possible the use of open type motors. However, attempts to isolate open type motors from hazardous

vapor or gas atmospheres have not always proved successful, because it is difficult to protect the shaft openings so that entrance of the flammable gases or vapors will be prevented. Approved Class I motors properly selected with respect to the vapor or gas atmosphere are much to be preferred to attempts at isolation as a general rule. Probable exceptions are motors used where pyroxylin lacquer residues, pyroxylin plastic, or carbon disulphide vapors may be present which have extremely low ignition points.

Motor Controllers, Overload Protective Devices, Switches and Resistance Devices

The rules for Class I locations provide that motor controllers, overload protective devices, switches, relays, the switches and contactors of auto-transformers, starters, resistance or impedance devices, or other devices or apparatus, which, in their normal operation, tend to create arcs, sparks, or high temperatures, be not installed within the hazardous area unless such devices or apparatus are of a type approved for use in explosive atmospheres.

In the case of motor controllers, those of the remote control type can often be selected and located at a point outside of the hazardous area, either in a specially built structure or in an adjoining room cut off from the hazardous area. Conveniently located push button stations or auxiliary control switches of the approved explosion-proof type may then be located in the hazardous area for convenient operation. In some instances this arrangement is not convenient or desirable and then recourse must be taken to the use of approved explosion-proof equipment in the hazardous area. Only rarely are resistance or impedance devices installed except as a part of motor controllers and these devices are also subject to the foregoing comment. Switches, other than those used as motor controllers, are also required to be of the approved explosion-proof type if in the hazardous area. As in the case of motors, listing of controllers by Underwriters' Laboratories is by groups, depending on the particular type of explosive atmosphere in which installation is intended. A number of types of controllers have been listed for the vari-

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ous manufacturers of this type of apparatus.

Heating Appliances

Electric heating appliances for Class I locations present a problem rather difficult of solution. The temperatures reached by the usual heating devices are often far above the apparent ignition temperatures of the various gases or vapors in the atmospheres of which they would be installed and so would furnish an excellent source of ignition to cause an explosion. To control such a situation the rules for Class I locations require that electric heating appliances be of a type approved for the particular location or type of material in or with which they are used. To date no such heating appliance has been listed, but possibly in the future one may be developed, as, for instance, an electric sterilizer for hospital operating rooms.

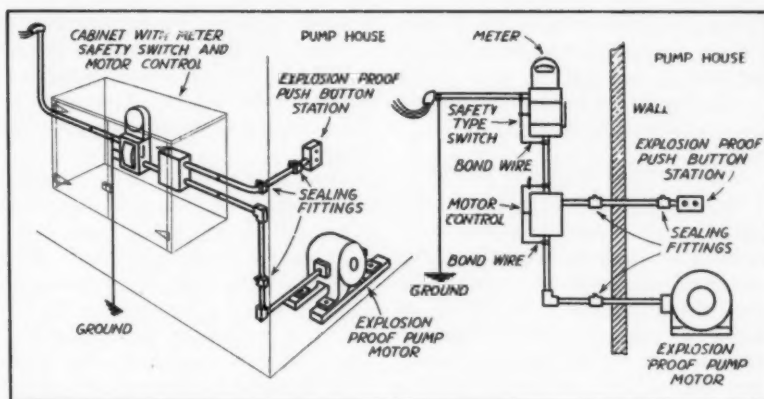
Steam, hot water or hot air heaters are to be recommended for general heating in all hazardous locations.

Lighting Installations

In the design of lighting installations for Class I locations, every effort should be made to eliminate the need for portable lights. This requires more than ordinary study and skill, especially where numerous machines are installed or where the character of the work done requires light of high intensity. However, it appears that in spite of the best intentions, portable lights will be used and hence, the rules provide for the construction and installation of both fixed and portable units.

Fixed lighting units are, first, required to be enclosed in protective globes of approved design. The temperatures reached by some parts of an incandescent lamp, especially one of high wattage, is often in excess of the apparent ignition temperatures of certain vapors and gases. By providing such lamps with enclosing globes or with specially designed fixtures with heavy glass lenses the maximum temperature of exposed parts is considerably reduced and, further, assists to some extent in preventing breakage.

To reduce maximum fixture temperatures it is often to be recommended that oversized enclosing fixtures be used and also that a larger number of lower wattage units be used rather than a smaller number



Suggested Pump Motor Installation for Bulk Gasoline Station: Note that service equipment and magnetic motor controller are located in a cabinet on the outside of the pump house leaving only the pump motor and the push button station within the hazardous area. The necessary sealing fittings to be provided by the installer are also indicated.

of higher wattage units to obtain the same intensity of illumination.

Where fixed lighting units are exposed to breakage, they are required to be protected by substantial metal guards or other approved means. Heavy glass lenses may be accepted as "other approved means" if found to have the proper strength and characteristics. Only in rare instances, such as in the case of high ceilings, should fixed lighting units be considered not exposed to breakage.

Lighting units of the fixed type are to be directly connected to the conduit system or outlet box at the ceiling except where rigid conduit hangers are used. Drop cord pendants are not permitted by the rules for Class I locations.

Switches for lighting installations if within the hazardous area are required to be of the approved explosion proof type. However, it is often possible to install the switches outside of the hazardous area and so permit the use of the ordinary non-explosion-proof type.

As has been previously stated, the use of portable lights and all other portable devices should be avoided if at all possible. However, the rules make provisions for such devices and for their cords and connections.

Portable lights are required to be protected by both an enclosing globe and a substantial guard and the entire assembly especially approved. Sockets are required to be of the keyless type.

Cords for portables may be of either the type S (heavy rubber jacketed cord) or the type PA (rein-

forced steel armored cord). Of these the former is to be preferred owing to its greater flexibility. The rules require that an extra conductor be provided in the cord for use as a grounding conductor to serve to effectively ground the metal parts of the portable device. If the type PA cord is used, the metal armor should not be considered acceptable for the grounding circuit.

Receptacles and plugs for use with portable cords may be one of two types. First, they may be of the type consisting of an assembly of an explosion proof switch combined with a plug and receptacle and so arranged that the plug cannot be removed unless the switch is in the "off" position. Second, they may be of the type consisting of a plug and receptacle so designed that when the plug is removed the arc is sealed within an explosion proof chamber or enclosure. Both types effectively remove the hazard which would be present were the resulting arc permitted to occur in the open. It should be mentioned that both types are required to be of the polarized design to provide a connection for the grounding conductor of the portable cord.

When it is desired to connect portable cords direct to supply conductors, which probably will be but rarely, the rules require that the cord, in addition to first being made mechanically secure, soldered and heavily taped, shall then be securely supported so that the probability of a break in the conductors at the point of attachment will be minimized. There is available a special

fitting for this purpose, which provides a chamber for making the connections, a compression grip device to take the strain from the joints and also facilities for sealing.

Special Rules for Spray Booths

Motors, lamps, switches, or other electrical devices are not permitted to be installed in spray booths, in ducts connected therewith, nor in any location where there is a possibility of the spray lodging on them. It also requires that the auxiliaries of mercury vapor lamps, which include open resistors, be offset a distance of at least 10 ft. from the working face of the spray booth.

Compliance with these requirements is especially important when pyroxylin lacquers are used as the residue or dust of such lacquers break down at temperatures as low as 212 deg. F., or much below the temperature of even an explosion-proof lighting fixture. Spray booth interiors may be lighted by means of flood lights placed at least 10 ft. away from the working face of the booth or by explosion-proof lighting fixtures placed behind and outside of wire glass panels in the walls of the booth.

Gasoline Discharge Devices

Underwriters' Laboratories have established standards for the design and test performance of motor driven gasoline discharge devices for filling stations. Where formerly the pump itself was examined and tested as an

individual device, the new procedure provides for the examination, testing and listing of the entire pump assembly, including the motor, its control switch, and wiring as a complete unit.

The standards provide requirements which are in thorough conformity with the rules for Class I locations except that the lights within the pedestal used for lighting the dial are not yet required to be enclosed in explosion proof fixtures. This latter will undoubtedly come later as suitable fixtures are developed. The dome light may be considered outside the hazardous area, provided a seal is made under the dome fixture and its socket so as to prevent vapors passing into the fixture. The switches for controlling the lights, however, are required to be of an approved explosion-proof type.

The device is usually received at the filling station for installation, completely wired down to the explosion-proof junction fitting located in the base of the pump. The installer runs a circuit from the filling station building to the pump and makes the necessary conduit connection to the junction fitting in the base of the pump and then seals off the conduit at the fitting in the base of the pump with a suitable compound.

Many old style pumps are being changed over to comply with the above standard. In this connection it should be emphasized that all junction boxes and other fittings should

be of the explosion-proof type and only rigid conduit with threaded joints be used. Armored cable, park cable, and wiring materials other than rigid conduit are not permitted by the rules.

Grounding

The proper grounding of the non-current carrying parts of equipment is very important because of the fact that should an accidental ground occur anywhere in the system within the hazardous area, the service fuses, or other circuit protection, should open immediately and clear the circuit. To provide for a reliable grounding circuit, provisions additional to those in Article 9 of the Code are included. These require that bonding jumpers or other approved means be used rather than depending on the locknut and bushing type of contact. Inasmuch as positive threaded connections are used at all points within the hazardous area, and as the method is recognized as approved, the bonding jumpers need be used only up to and including the point where connection is made to the water pipe or other grounding electrode. Special attention should be given to the matter of securing a good ground and to the installation of the grounding conductor and its connections.

In the next installment, the fourth of this series, the rules for Class II locations will be discussed in a similar manner, followed by Classes III and IV.

Second Open Hearing on Construction Code

A second hearing on the construction industry code and supplemental codes was held in Washington on November 20 with Division Administrator Malcolm Muir presiding and General Hugh S. Johnson in attendance. Since the previous hearing on September 6 a large number of questions have been raised and many meetings of code committees representing several branches of the construction industry have been held to iron out the differences. The recon-

vened hearing on November 20 was held for the purpose of hearing all interested persons.

The several contracting and sub-contracting industries represented in the different supplemental codes reiterated their desire to have a basic code sponsored by the Construction League of the United States. Organized labor on the other hand was opposed to this correlating of the construction industries in one code. The American Federation of

Labor took the position that the construction industry had two separate and unrelated classifications, viz., building construction and open or outdoor construction. It was contended that in the former class of work, 85 percent of the labor is skilled, while in the latter class of work virtually all the labor is unskilled.

Each association at this hearing was asked to show its representation. There had been some conflicts

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between one or two of the subcontracting groups and in some instances labor also had raised the question of adequate representation.

With few exceptions the discussion related to the basic principles involved in hours, wages and area agreements. Except for the electrical contractor's code very little discussion was held upon individual industry codes.

66% Representation

L. E. Mayer, president of the National Electrical Contractors Association, presented through L. W. Davis, general manager of the association, a statement relative to the operations of the electrical contracting industry and the representation of the association. This statement showed that the National Electrical Contractors Association represented through its members and through local associations that have cooperated with it in this code work approximately 66 percent of the employing electrical contractors.

Shortly before this hearing several local associations of electrical contractors were approached by representatives of the International Brotherhood of Electrical Workers for the purpose of getting them to object to the electrical contractor's code as it then stood. Some of these local associations did voice such negative opinion with N. R. A.

Mr. Muir asked Mr. Davis if there were certain members of his group that favored some other code for the industry. Mr. Davis, in reply, stated that those that had so recorded themselves had later been advised of the true facts and, in his opinion, in practically every case were prepared to again reverse themselves.

The I. B. E. W., in a very carefully prepared statement, touched upon this latter testimony of Mr. Davis and while it did not question the representation of the N. E. C. A. in numbers, it did as to quality.

The rest of the testimony of the I. B. E. W., which was presented by E. Biertz, protested against the adoption of a master code for the construction industry with the electrical contractor's code subordinate and responsible thereto. Mr. Biertz was of the opinion that if a code authority for the electrical contracting industry was set up in accordance

with the code as it now stands, that the electrical contracting industry would not have complete freedom of negotiation with labor.

The I. B. E. W. brief protested to the exemption of telephone, telegraph or power companies from the provisions of the code except insofar as it related to the installation of their own equipment in their own properties. The brief contended that any installations of telephone, telegraph or power company electrical equipment in premises other than those owned by the utility companies should be made under the same regulations as covered any other installation of electrical work.

Labor also objected to the present form of labor policy which set forth a 40-hour week, set up a minimum of 40 cents for unskilled labor and left skilled labor negotiations to be arrived at in area agreements. Labor objected to the provisions for maximum hours as providing no increase in employment. Labor contended that journeymen electricians were now employed on an average 20 percent. Labor recommended the maximum hours to be reduced to 35 hours per week and to 7 hours a day and not more than 10 days in any 14-day period.

Want Skilled Minimum Wages

Labor objected to the provision in the code of minimum wages for unskilled labor only, contending that such wages might easily become the base wage for all workers at the conclusion of existing agreements. It was asked that some provision be made limiting the number of helpers and apprentices with respect to the number of journeymen on the theory that it would be possible to employ a large number of helpers with a single journeyman and in that way reduce the scale to the unskilled minimum. It was also pointed out that there was nothing in the code to prevent the one-man contractor who employed no labor from using the unskilled wage minimum and thereby create unfair competition.

In objecting to the area agreement method of arriving at skilled labor minimum wages, labor contended that since the rules and regulations governing the procedure of the members of the industry in such collective bargaining makes the power of the area groups subject to the approval of the

code authority for the entire construction industry full freedom of negotiation is not possible. Labor proposed instead that the code set up minimums for skilled labor of not less than those established by the government on public works projects under the P.W.A.

The I.B.E.W. also asked "for direct representation on any control board when that board deals with wages, hours, conditions of employment, employment opportunities, or any other matters properly coming under it, or any other matters affecting or influencing it, or any other matters that come under collective bargaining."

N.E.M.A. Protest

The National Electrical Manufacturers Association on October 26 filed with N.R.A. objections to the electrical contractors' code claiming that the definitions of an electrical contractor and electrical worker were too broad. The manufacturers contended that the electrical contractor "is not and cannot be equipped to adequately carry on over the country the functions claimed in the definition," claiming that many of these functions are necessary to be performed by the manufacturer, and that to impose the contractor's code upon him would be uneconomic and would work unnecessary hardship. Manufacturers further objected to the inclusion of factory maintenance work and repair work under the contractor's code. The electrical manufacturers, however, made no protest at the November 20 open hearing.

At the conclusion of the open hearing Mr. Muir announced that General Johnson was appointing a committee to iron out the differences in opinions and viewpoints.

The N. R. A. indicated that it was anxious to have these codes settled and approved as soon as possible because construction was a matter of great public concern.

This committee, which was set up by General Johnson, started to work immediately upon the conclusion of the open hearing. It was expected that it could complete its work in time for another hearing on November 27 but this was not possible. Accordingly the matter is now scheduled for hearing on December 4, at which time the administration hopes to be able to have the differences very largely settled.

N.E.C.A. Viewpoint On Inspection

By L. E. Mayer

President, National Electrical Contractors Association

This address was delivered before the national convention of the International Association of Electrical Inspectors on September 15, 1933, and is reprinted here because of its unequivocal statement of policy regarding the National Electrical Code and the local administration of wiring regulations.—Editor.

ELECTRICAL inspection is essential to the progress of good electrical construction. I shudder to think of the chaotic conditions that would result did we not have the National Electrical Code administered by competent enforcement authorities. We see today what can happen when there is any lessening of inspection. In almost every city in the United States the depression has brought about curtailment and sometimes elimination of inspection activities. Departments have been reduced to the minimum. The moment we reduced those forces we made it possible for the bootlegging of wiring to develop. This naturally is of tremendous concern to electrical contractors. It not only takes work away from them, but it also reduces the public appreciation for the ordinances which we have worked so hard to obtain. This breaking down of public morale with respect to wiring ordinances is not good. Bootlegging has also introduced cheap wiring and poorer wiring—wiring that never would stand inspection. This increases the public hazard.

We need strong ordinances based upon the National Electrical Code and it is our hope that if these ordinances are revised and new ones drafted that there may be greater uniformity in order that we may arrive at better standards for electrical work. At the same time we realize that the National Electrical Code is a minimum, despite the fact that there are interests that would destroy even this minimum. In 50 years this Code has grown because of necessity. Every effort has been made to keep it as simple as possible, but because of the complexity of electrical wiring

and the growth in products and application, it has been necessary to have for the industry an intelligent Code of installation. Any attempt to break down this Code would be suicide for the entire electrical industry. In fact, it is the opinion of the organization which I have the honor to represent that in many cities the regulations of the National Electrical Code will have to be augmented by special rules to take care of special local conditions. It is our opinion, therefore, that instead of reducing the National Electrical Code to a very few simple terms, it will be decidedly necessary, if we are to get any standardization in Code interpretation and wiring installation, that the Code become more detailed as years go on.

It seems, therefore, that we have much in common. Why is it then that your association and the N.E.C.A. have not maintained closer contact? Are there not perhaps some things that we could work on jointly?

For more than 50 years we have been installing electrical work in buildings in this country. When the work was originally installed it was closely inspected. That work was put in by competent men who had a pride in their work. Why is it that we have done nothing with those installations after they have been installed? Are those installations expected to live forever in spite of all of the abuse they have and the tampering from untrained people?

In other words, we have a reinspection problem in this country which only you gentlemen can solve. You put your O. K. on the work in the beginning and until you remove that O. K. the public is going to believe that the work is all right. It seems to me that as defenders of the public safety that you are just as much concerned with the safety of the public after it occupies these buildings as you were before the buildings were occupied. We ask you to give consideration to plans for regular and systematic reinspection.

From your deliberations it is seen that you are interested in securing

for your cities the services of only competent installers. We are heartily in accord with that sentiment and we know that most of you have made earnest efforts and successfully, to secure the passage of ordinances requiring the licensing of contractors. We now ask you to use your influence in making such ordinances effective by promptly prosecuting those who fail to live up to the ordinance and further by establishing a public goodwill for licensed contractors. It is not enough to pass a law. The law must have the public behind it and the law must have enforcement.

The National Electrical Contractors' Association wishes to put itself on record with the International Association of Electrical Inspectors as being decidedly in favor of progress in the development of our art. We are vitally interested in economies and new and progressive methods of wiring. It is inconceivable to us that an art such as ours can go on growing year after year without the development of new processes and methods. At the same time our association will not look with favor upon any new method, which introduces a new hazard to life or property, which is uneconomical or which materially reduces our standards. It is not enough that a material show some economy in first installation. We insist that the maintenance of the installation also be given consideration in establishing the ultimate economy thereof. We make this statement particularly as showing our position with respect to bare neutral and concentric wiring. The records of our members from across the Atlantic are undeniably evidence of the costliness of such methods in the long run. The introduction of such methods, in our opinion, would be most decidedly a backward step. Give us greater economies by new wiring methods by all means, but please do not force upon us the use of systems of lower standards whose only apparent advantage is some alleged cheapness.

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Public Education on Electrical Hazards

In line with its program to promote the education of the public regarding the fire and life hazards of electricity *Electrical Contracting* is pleased to report a number of recent examples of such activity. At the same time it requests information on any other similar activities.

—Editor

Kansas City, Mo.—On October 25 City Electrician Leo J. McCormick and League Manager G. W. Weston talked to sixty-five negro janitors on "Electrical Fire Hazards in Apartment Buildings." Many of the hazards were demonstrated with equipment. All who attended the meeting were given literature on the new labeled cords.

Last month's issue carried the news of the Kansas City activities among the school children during Fire Prevention Week.

* * *

Kenosha, Wis.—At the meeting of the Wisconsin Chapter, I. A. E. I., on October 17 Electrical Inspector George Morzfeld of Kenosha outlined his activities in educating the public to demand electrical inspection and to insist on approved devices. He has fitted up an exhibition board by means of which he can demonstrate the hazards of improper fusing, gasoline hazards, dust hazards and similar subjects covered by the Code. This exhibit is taken to meetings of local social, fraternal and business groups.

In illustrating the effect of unapproved fuses, for instance, Mr. Morzfeld short circuits fuses surrounded by cotton and shows that the unapproved fuse on blowing will ignite the cotton while the approved will not.

More than 7,000 people have seen this demonstration so far.

* * *

Fort Wayne, Ind.—V. H. Tousley, electrical field engineer, N. F. P. A. at a meeting held on October 11 under the auspices of the Fort Wayne Electrical Contractors Association, to discuss the National Electrical Code, made a radio



ELECTRICAL FIRE-SHOCK EXHIBIT AT ELGIN, ILL.

broadcast over station WGF on what the Code does for the public.

* * *

Chicago, Ill.—Commissioner William A. Jackson, during the national convention of the International Association of Electrical Inspectors in September, spoke over a nation wide hookup on "The Electrical Inspector's Service to the Public."

* * *

Elgin, Ill.—During Fire Prevention Week in October the fire chief of Elgin and City Electrician Alvin R. Copeley held in a vacant store a fire and shock prevention exhibit that was very well attended. A picture of the electrical exhibit is shown on this page. It included open knife switches, unsafe service entrance, cord wiring, frayed cords, grounds, the bathtub hazard, socket type baseboard receptacles, flat-irons left in circuit, etc., all plainly placarded.

In addition each person who attended the exhibit was given a leaflet on "Fire Shock Prevention" which had been prepared by the city electrical department. This leaflet besides urging inspection on all electrical work, suggests that all electrical products be purchased from an electrical contractor-dealer in order to be sure of quality. The

leaflet tells how much it costs to operate lamps and appliances, gives a few rules for electrical safety, tells of the evil of overfusing and of cord wiring and closes with a few words on the shock hazard of even small currents.

* * *

Madison, Wis.—The Industrial Commission of Wisconsin on August 12 released to the public a short discourse on "Low Voltage Hazards." After mentioning half a dozen electrocutions that occurred in the state in approximately two months, the release gave the following six precautions for the public to take:

1. Have your electrical installations made, inspected and repaired by competent electricians.
2. Treat all electrical conductors as alive.
3. If you receive a shock from any appliance, device, switch or part of your electrical circuit, even though the shock is slight, have the equipment checked over by a competent man.
4. Be especially careful with electrical equipment used where floors or walls are damp or grounded. Do not stand on a basement or other damp concrete floor or metal surface when using an electric iron or other electrical appliance. Use a rubber mat or a wooden platform.
5. If brass shell sockets are used, they should be keyless and out of reach.
6. Frayed or worn cords, broken plugs or sockets or any bare wires are dangerous. Have them repaired before you use them.

electrical contracting

With which is consolidated Electrical Record

S. B. WILLIAMS, Editor

A CHALLENGE TO WISCONSIN

IN the fifteen years 1918-1932 inclusive the reported fires in the State of Wisconsin showed a loss of \$143,125,323 of which \$10,912,404 were due to electrical origin. These figures which were reported in the 1933 Wisconsin Electrical Inspectors Review, just published, also give the 1932 fire loss from electrical causes as \$816,649 of which \$760,437, or 93 percent, was charged to defective electric wiring.

If the percentage of loss due to defective wiring during the entire fifteen years was approximately the same as in 1932, and the figures from 1925 indicate that it was higher, then this one cause alone during that time accounted for more than \$10,000,000 of loss or an average of \$667,000 a year.

Of course, it must be understood that these figures cover reports from fire departments and other sources and are not always checked to determine the exact cause of fire. Even so, it is apparent that there is a large annual loss from defective wiring.

This loss can be very materially reduced by systematic reinspection. How much is it worth to the State of Wisconsin?

Wisconsin has been justly proud of its national reputation for progressiveness. Through its Industrial Commission a fine degree of cooperation has been engendered between inspection authorities and contractors to improve the character of wiring installations.

But what of the wiring after it has been installed? What of the existing defective wiring?

These figures on electrical fire loss give Wisconsin another opportunity to show its progressive spirit and to lead in an activity which might become a model for other states and communities to follow. Reinspec-

tion does not have to be forced down the people's throat to be effective. The people can be educated to demand reinspection.

The Industrial Commission has the respect and confidence of the public and the electrical industry of the State. Through cooperation the Commission and the industry can sell reinspection to the people of Wisconsin. Newspapers will be glad to carry the story. Civic and social organizations will be interested to hear it.

We eagerly hope that Wisconsin will accept this friendly challenge.

THE 17% MEN

THERE is a class of English gentry for whom we have always had a certain amount of sympathy—the remittance men. Each month or quarter they receive their remittance which is large enough to keep them from starving yet with which they must maintain the position of a gentleman.

In this country we have a class that also arouses our sympathy—the 17 percent men. They are the industrial electrical contractors who for 17 percent are expected to provide engineering salesmanship for the manufacturer of industrial electrical equipment.

Their's not to question why, their's but to sell or die—but they are raising the question and their voices are getting louder and are coming from more and more quarters.

The policies affecting the sale of electrical equipment to individual industrial plants can not be satisfactory when so many sales are unprofitable to the seller, no matter who he be. Prices, discounts, selling methods, classification of accounts, costs—all must be studied.

It is ridiculous to find that industrial customers, even of modest size, can and do buy electrical equipment at the same or lower prices than the contractor who can and does create business. We say it is ridiculous because it encourages chiseling on the part of the industrial buyer and discourages sales creation on the part of the contractor. Such prices to the industrial do not create one iota of business—they merely lower the annual dollar volume of sales to this group. Besides, such prices by discouraging the contractor retard creative selling and thereby further lower the volume.

This whole subject is very much like the tax situation. In good times we heard very little about the high taxes because they were not felt excessively but today, with lowered income, everyone is grumbling about the tax burden. So it is with the industrial

electrical contractor. In good times he had enough installation work to absorb overhead and equipment sales cost. Today, however, it costs more than ever before to sell and this contractor with a much smaller volume of work cannot absorb these costs.

From every section of the country come reports that the industrial electrical contractors are realizing this situation and are seeking relief in the form of margins sufficient to permit selling equipment at a profit.

They point, for instance, to photo-electric equipment priced at \$100 and ask how much selling of an engineering nature they can do for \$17. They cite a motor starting switch that lists for \$2.00. If a contractor buys a stock of twenty-five he can make all of 51 cents on the sale of one of these switches. They raise the question, Is it worthwhile? We raise the question, Why such low prices in the first place?

It is obvious that the manufacturer must cover his cost of production, overhead and sales cost and have a profit. When that is done why set a price that denies a profit to the industrial electrical contractor?

It sometimes seems as though the manufacturer, after covering himself sets a price as low as possible for the consumer without serious regard for those who could and would create business for the manufacturer.

If the manufacturers were convinced that they could sell this industrial market direct without any other assistance then such a policy would certainly have merit. But any manufacturer of industrial electrical equipment knows, if he has made any analysis of sales cost, that he cannot entirely sell this market direct and at a profit, unless he is willing to limit his market to a few large industrials, or to a specialized class of industrial.

It is well known that the largest part of the sales volume of industrial electrical equipment comes from but a very small percentage of the total number of customers. Such customers include resale manufacturers and very large industrials. Their requirements are sufficiently large and as a rule sufficiently special to warrant direct selling by the manufacturers. After this business has been deducted from the aggregate there is still a substantial volume that must be sold, much of which right now is not being sold at a profit either by the manufacturer or the industrial contractor.

Such cost studies as have been made show very definitely that in most instances the direct sales by manufacturers of industrial

electrical equipment to individual plants are not profitable.

This whole subject of selling industrial electrical equipment needs attention right now. If we are to create more business we need the selling of every competent agency. The industrial electrical contractor can and will sell when he can do so profitably.

Joint meetings between the contractors, wholesalers and manufacturers should be held but not we hope, as in the past, to hash over examples of mistakes. Everybody has done things they should not have done and to focus attention on errors is merely inviting the accomplishment of nothing.

We urge the contractors to commit to paper what they need in the way of margins, protection, customer classification, etc., to enable them to sell at a profit. We further urge the contractors to prove this need—prove it by facts.

In other words, if the manufacturers accede to the contractors' demands what business can the contractors assure the manufacturer? Analyze your accounts and your possibilities and in that way show the manufacturers the business they are missing because of the present policies.

Facts such as those command attention.

MISLEADING LABELS

THERE has recently come to our attention several instances of poor material being offered to contractors and to dealers at very low prices and with the implication that it was approved material.

Short appliance cords with bracelet cord but the whole thing assembled in a jail; dangerous immersion heaters playing up the use of approved cord in a manner to lead one to believe the heaters were approved; sheathed cable with Underwriter's Laboratories wire labels attached to mislead one into thinking the cable was approved, etc.

There is only one kind of protection against such tactics and that is to buy nothing except from a source that is known to be reliable. That type of material could not be sold even at a very low price except by misleading the buyer into thinking it was approved. Even at those low prices the buyer pays every cent it is worth, if not more.

It is a safe rule for a contractor to follow to buy from recognized electrical wholesalers. Contractors buying in this fashion can be certain of the quality of the materials.

\\ code chats ///

A MONTHLY DISCUSSION OF WIRING PRACTICE AND QUESTIONS OF INTERPRETATION, PRESENTED WITH A VIEW TOWARD ENCOURAGING A BETTER UNDERSTANDING OF THE NATIONAL ELECTRICAL CODE

CONDUCTED BY F. N. M. SQUIRES

ASSISTANT CHIEF INSPECTOR, N. Y. BOARD OF FIRE UNDERWRITERS

THREE-WIRE CIRCUIT

In the November issue the sketch shown with our Chat on the 3-wire circuit was not exactly as intended. We intended to show the 3-wire branch circuit as being supplied from the two outside wires of the feed and the neutral and not to show it as having the outside wires come from the same side of the 3-wire supply.

However, the text of our article did take care of the condition actually shown in the sketch in which we mentioned that if both of the outside wires were taken from one side of the feed we would have to give attention to the size of the neutral.

MOTOR DUTY

Kindly explain the meaning of a continuous duty motor. Would a 2 H. P. motor used on a shoe repair machine require overload protection? Would the classification of this motor change according to the length of time it was in operation? There are some contractors who believe that this motor should be classed as "short time duty" motor.

The Code refers to definitions in the A.I.E.E. Standards for the various duties of motors and we are, therefore, quoting some of them.

Continuous duty is a requirement of service that demands operation at a substantially constant load for an indefinitely long time.

Short-time duty is a requirement of service that demands operation at a substantially constant load for a short and definitely specified time.

Intermittent duty is a requirement of service that demands operation for alternate periods of (1) load and

no load; or (2) load and rest; or (3) load, no load and rest.

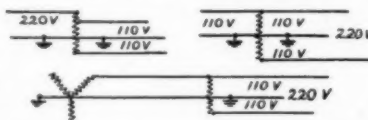
Periodic duty is a type of intermittent duty in which the load conditions are regularly recurrent.

Varying duty is a requirement of service that demands operation at loads, and for periods of time, both of which may be subject to wide variation.

USE OF AUTO-TRANSFORMER

I do not understand b-(1) on page 34. Will you please make a sketch showing how an auto transformer can be used to comply with this rule, showing how the identified wire must be grounded at both places.

At times conditions are encountered which require special treatment. Rule



500-b-1 was provided to permit such a condition to be covered. It is to take care of cases where the available supply does not meet the requirements. Some of these are shown above.

WHY NOT TO FUSE A NEUTRAL WIRE

Why don't they allow a fuse in the grounded wire of a lighting circuit? What harm would it do?

With a fuse in a grounded neutral circuit wire several things may happen.

If we have a 3-wire system and the neutral fuse blows, the full voltage (generally 220) is impressed across the outside of the circuit. If the load

on each side of the neutral is balanced nothing happens. However, if, as is generally the case, the load is not balanced and there are only a few lights on one side and quite a few more on the other, the lights on the "few" side are impressed with a higher voltage and generally burn out. This, while not always a fire hazard is an economic loss.

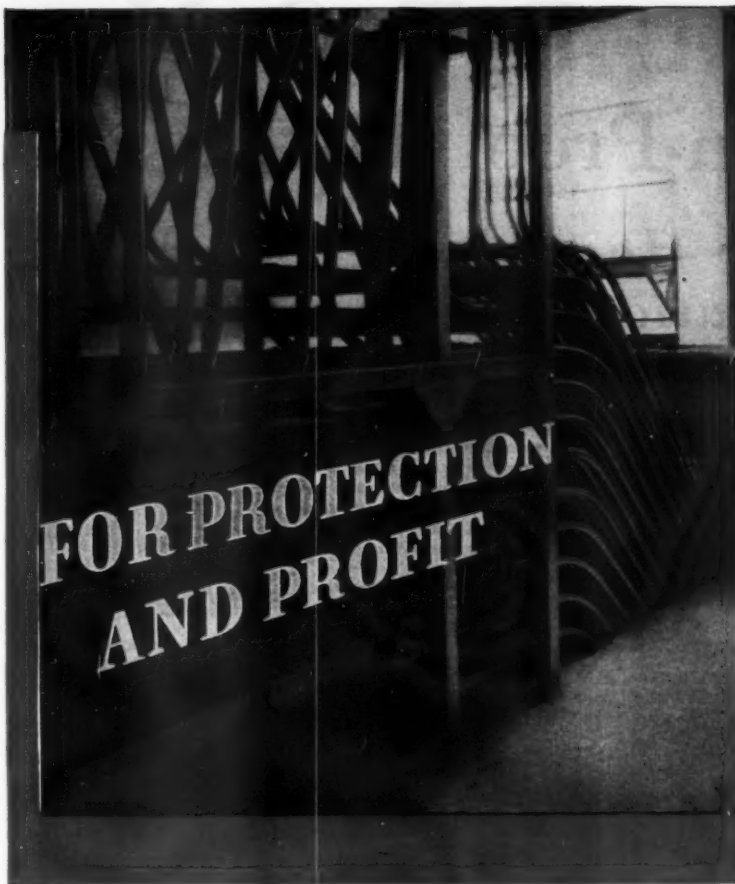
Then consider the condition which exists on the above circuit after the lamps have burned out. We will have then a voltage of 220 across the sockets of the blown lamps. The circuit, from all appearance seems to be dead which, of course, it is not. This, of course, presents a serious life as well as fire hazard. And a fuse in a grounded neutral wire is not needed in as much as a proper fuse in the live wire of a circuit affords sufficient protection and then when it blows the circuit is dead.

SINGLE WIRE UNDER PLASTER EXTENSIONS

510-(b) allows single wires for under plaster extensions, but wouldn't the induction heat up the conduit or raceway? Single wires are not allowed in other places.

It should be noted that 510-a specifies that under plaster extensions are to be permitted only in buildings of fire resistive construction. It is therefore expected that the small amount of heating which may be encountered due to induction from the use of a single wire within an armor will not present a serious fire hazard. As underplaster extensions are not to be used in general for circuit wiring but only for extensions to already existing circuits, it can be realized that the

Electrical Contracting, December, 1933



USE G-E WHITE RIGID CONDUIT

For wiring jobs requiring permanent protection against corrosion . . . against moisture, oils, acids and alkalis, use G-E White Rigid Conduit. Rigid conduit is the only system approved by the National Electrical Code as moisture, vapor and dust tight for use in hazardous locations and occupancies. It is adaptable to every type of building construction. It offers permanent satisfaction and service to your customers.

The permanence of G-E White is insured by its manufacturing process. It is Hot-Dipped Galvanized inside and out, with a heavy coating of zinc. Then an extra coat of Glyptal is added, inside and out. Glyptal is a development of the G-E Research Laboratories, and is used on no other conduit. It repels oil, acids, water and alkalis. It resists heat. It has a smooth, glass-like surface that does not crack.

G-E White is easy to bend, cut and thread. Wires slip through its smooth inner surface with ease. It is threaded to connect with all standard fittings.

For further information and service see our nearest G-E Merchandise Distributor or write Section CCF-2012, Merchandise Department, General Electric Company, Bridgeport, Connecticut.

RIGID CONDUIT

GENERAL ELECTRIC

MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT



G-E FIBERDUCT Always Provides Adequate Wiring

G-E Fiberduct is an underfloor-duct wiring system. It offers your customers a wiring system that is permanently adequate. It provides the outlets necessary for present requirements. It provides easy access to outlets necessary for future requirements. When a change in electric service outlets is desired, unused outlets may be neatly capped until needed again.

By giving permanently adequate electric service when and where needed, G-E Fiberduct increases the value of property. It is economical to install.

Any G-E Merchandise distributor will gladly supply you with complete information or write for booklet to Section CCF-2012 Merchandise Department, General Electric Company, Bridgeport, Connecticut.



FIBERDUCT

APPLETON

Explosion-Proof Fittings

For Hazardous Location Wiring



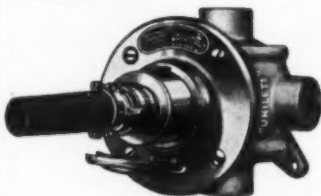
Type "ESUF"
Sealing Unilet



Type "GRUJ-2"
Unilet with Cover Removed
Showing Close-up Plugs
in certain Threaded
Openings



Type "EVA"
Explosion-Proof
Lighting Fixture



Type "CPSH"
Unilet complete with Lift
Cover and showing Type
"CPS" Plug Inserted
in Receptacle



Flexible Coupling



Type "CES"
Explosion-Proof Re-
ceptacle Equipment
Complete with Type
"CPS" Plug



Type "GRUST" Unilet with
1/2" Union Hubs



Type "FLP"
Explosion-Proof
Panel Board



Type "CPSIC"
Unilet Complete with
Lift Cover (Closed)



Type "EGK"
Unilet with Interlocking
Type Safety Switch, Plug
Receptacle and Type
"EGK" Plug Installed

There are many conditions such as in coal plants, flour mills, feed mills and similar places, which come under Class II locations, where combustible dust is thrown into the air, which in sufficient quantities will produce explosive mixtures. Also excessive amounts of dust can settle on electrical devices, causing serious fire hazards.

Appleton Explosion-Proof Fittings have undergone exhaustive tests and practical usage—and meet the requirements of the Underwriters Laboratories for use in hazardous locations. They are made of malleable iron, give thorough protection, are sturdy, and the cadmium finish makes them rust-resisting.

Write for Bulletin 1003. It will gladly be sent upon request.

Sold through Jobbers

APPLETON ELECTRIC COMPANY

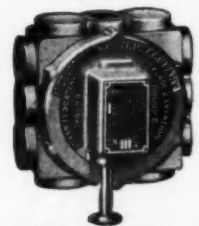
1749 Wellington Ave., Chicago, U. S. A.

New York—150 Varick St. Los Angeles—340 Azusa St.

San Francisco—655 Minna St.



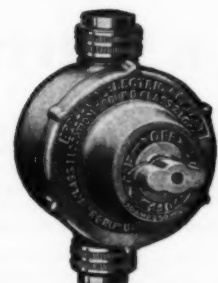
Union Connector



SW-3-A Series Explosion-
Proof Fitting with
Toggle Switch



Type "GRUJ-2"
Unilet



SW-1 Explosion-Proof
Fitting with
Snap Switch

APPLETON Explosion-Proof UNILETS

Reg. U. S. Pat. Off.

amount of current flowing in such an extension will not be sufficient to produce an excessive temperature.

SERVICE AND METER SEQUENCE

According to 405-i the service switch can be installed four different ways. Below are diagrams taken from Abbott's Code book. Please explain the advantages.

This shows the service switch on the supply side of fuses, with the meter protected by the fuses.



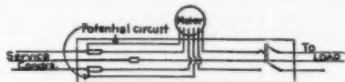
This has the advantage of making it possible to kill the fuses and meter for renewing or changing.

This shows the fuses located at the outer end of the service conduit.



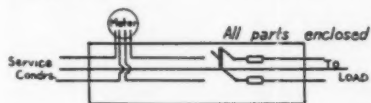
Here the service wires as well as meter and service switch are protected by the fuses.

Where the fuses are installed with approved sealable switch and cutout enclosure, the fuse and meter may be on the supply side of the service switch, and the potential circuit of the



meter may be on the supply side of service fuses.

This has the advantage of having the potential coils of the meter always energized whether the fuses are out or not. Yet the load coils are afforded fuse protection.



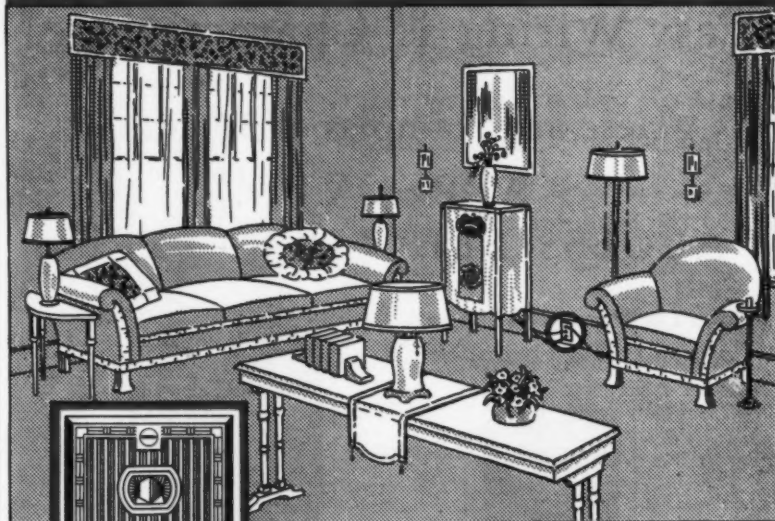
This is considered of advantage to the utility as it tends to prevent stealing of current. The meter, however, is not protected by fuses.

USE OF AUTO-TRANSFORMER

What is the difference between 501-b(2) and b-(3)? They both look the same to me.

I interpret (2) as follows: The transformer can be used for starting

MODERNIZED CONVENIENCE



with this RADIO COMBINATION

- Pass & Seymour—originators of the TRIPLEX triple convenience outlet, again offer you a new means of opening the door to a rewiring or modernization job.
- Your customers will be interested in knowing that any one of their present duplex outlets can be replaced with this new and modern radio outlet.
- It eliminates the usual unsightly tangle of wires and permits a neat flush installation for antenna and ground connections.
- In addition to the antenna and ground connections TWO power outlets are available—separated by a box divider or barrier.
- TRIPLE CONVENIENCE—antenna and ground—power for radio and power for radio lamp or clock—from the same single gang box.
- Your jobber's salesman will gladly give you more information on this new and modern method of wiring. Ask him about it today.

PASS & SEYMOUR, Inc.
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P & S-DESPARD LINE

MURRAY

SAFETY SWITCHES

Easy Wiring is Characteristic!

Here are examples of 30 amp.
**APPROVED
ACCESSIBLE FUSE TYPES**

From "On" to "Open Door"
Position is One Operation



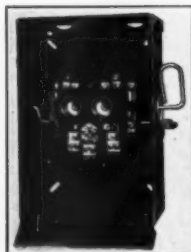
"Open Door" Position



"On" Position



30 Amp.—3 Pole—2 Fuse
Solid Neutral—125-250 V
Sequence
Switch—Meter—Fuse



30 Amp.—3 Pole—2 Fuse
Solid Neutral—125-250 V
Sequence
Switch—Fuse—Meter

Send for Catalog of
**METER SWITCHES, RANGE SWITCHES,
FUSED AND UNFUSED SAFETY SWITCHES**



**METROPOLITAN
DEVICE CORPORATION**

1250 ATLANTIC AVENUE
BROOKLYN • NEW YORK

an induction motor whether included in starter cases (which I interpret for compensator) or installed as separate unit.

Does it mean the motor switch in one box and auto transformer in another?

b-(3). This seems to be a compensator as b-(2).

Our correspondent's interpretation of b-2 is correct and the motor switch may be in one box and the auto transformer in another.

b-3 is where the circuits are contained wholly within the enclosure in which the auto transformer is contained. In most cases this would not involve a motor.

BARE NEUTRAL IN SERVICE

(404-e) When a bare grounded wire is run in a pipe for an overhead entrance, the pipe does not have to be grounded, but when done this way for an underground service the pipe must be grounded.

Why is the pipe not grounded for overhead system?

Rule 404-c does not say that the conduit containing a bare neutral service conductor from an overhead supply line shall not be grounded. It does say that where a bare neutral service conductor is used it shall be in rigid conduit—that is, it shall enter the building in a rigid conduit. Then rule 404-j requires that it shall be grounded.

In any case, therefore, service conduit containing a bare neutral service conductor has to be grounded.

CAST-IN-PLACE RACEWAYS

(509) Where do they use cast-in-place raceways?

Where could I see such a job?

What is their advantage over other raceways?

Cast-in-place raceways are generally nothing but a hole in cement. They are made by laying in place long lengths of soft, tough, strong, round rubber and then pouring a rich mixture of sand and cement over them. As soon as the cement has set the rubber core is pulled out leaving the smooth holes through which wires may be drawn.

There are only a few such jobs in one or two of our larger cities.

The advantage of such a system is in its permanency. Being just a hole in the cement there is nothing about it to rust or corrode.

FINE BUILDINGS EVERYWHERE *are using* Steeltubes



LEAVENWORTH, KANSAS, HIGH SCHOOL
Associated Architects: Felt and Hazelwood, Leavenworth, Kans.; Felt, Dunham and Kreih, Kansas City, Mo. *Electrical Contractor:* Ernest Lord, Leavenworth, Kans.



POSTAL LIFE AND CASUALTY INSURANCE BUILDING, KANSAS CITY, MO.
Architect: Edward W. Tanner, Kansas City, Mo. *Electrical Contractor:* L. D. Ward Electric Co., Kansas City, Mo.

Kansas and Missouri step into the limelight with two new attractive buildings which will depend on Steeltubes for many, many years for the protection of their electrical circuits. Approximately 40,000 feet, almost eight miles, of Steeltubes was installed in the Leavenworth, Kansas, High School, and in the Postal Life and Casualty Insurance Building, Kansas City, Missouri.

These are the types of buildings on which every contractor likes to work. They provide the opportunity to do a job of which he will be proud—and with Steeltubes they present the opportunity to make a real profit—particularly if other contractors are sticking to old-style heavy raceways.

Steeltubes weighs less—handles easier—bends with less effort—cuts quickly—requires no threading—installs faster and speeds up the job. Contractors who have used it once never go back—but why don't you let us send you full information and a sample joint. In five minutes you will sell yourself. Write today—and put yourself with those that make money with Steeltubes.

Electrical Division

STEEL AND TUBES, INC.

WORLD'S LARGEST PRODUCER OF ELECTRICALLY WELDED TUBING

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A UNIT OF REPUBLIC STEEL CORPORATION

N.E.C.A.

NEWS AND SERVICE INFORMATION

MATERIAL FOR THIS DEPARTMENT IS SUPPLIED BY THE HEADQUARTERS STAFF OF THE NATIONAL ELECTRICAL CONTRACTORS ASSOCIATION
420 LEXINGTON AVENUE, NEW YORK, N. Y.

President, L. E. Mayer
14 North Franklin Street, Chicago, Illinois

Vice President, Earl N. Peak
1603 West Main Street, Marshalltown, Iowa

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Contractors Organized for Industry Welfare

NEW N. E. C. A. CHAPTERS

The Electrical Contractors Association of Southern California covering the jurisdiction south of the southerly boundaries of San Luis Obispo, Kern and Inyo Counties, to be known as the Southern California Chapter. G. E. Arbogast, 1034 Venice Blvd., Los Angeles, California, President. A. L. Stone, 710 West Pico Street, Los Angeles, California, Secretary-Treasurer.

Master Electrical Contractors Association of Brooklyn, N. Y., covering the jurisdiction of their own membership, to be known as Master Electrical Contractors (Brooklyn) Chapter. Benjamin Reiss, 50 Court Street, Brooklyn, N. Y., President. L. C. Seider, 8020—18th Ave., Brooklyn, N. Y., Secretary.

Kings County Electrical Contractors Association, Inc., covering the jurisdiction of Kings County, New York, to be known as Kings County Chapter. Louis D. Kennedy 5217 5th Avenue, Brooklyn, N. Y., President.

Fulton County Electrical Contractors Association covering the jurisdiction of Fulton County, New York,

to be known as the Fulton County Chapter. B. E. Shell, 21 West Fulton Street, Gloversville, New York, President. Frank Foster, 8 South Perry St., Johnstown, N. Y. Secretary.

Northwestern Ohio Electrical Contractors Association covering the jurisdiction of Allen, Auglaize, Mercer, Van Nort and Putnum Counties, Ohio, to be known as the Lima, Ohio Chapter. J. F. Reed, 125 East Market Street, Lima, Ohio, President. C. P. Sweeney, 216 East Market Street, Lima, Ohio, Secretary.

Electrical Contractors Association of San Antonio covering the jurisdiction of Bexar County, Texas, to be known as the San Antonio Chapter. W. M. Graham, 801 Main Avenue, President. A. C. Loyd, 905 A. South Alamo, Secretary.

NEW MEMBERS

The following applicants have been accepted into the N. E. C. A. since the publication of the list in the November issue:

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Merced:
Smith Elec. Service

Palo Alto:
Burkhart Elec. Works

Sacramento:
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Central Elec'l Studio
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G. Vaccarino
West Coast Elec. Works, Ltd.
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Valley Elec'l Service

Sonora:
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G. W. Masters Elec. Co.
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Frederick Clagett
Ralph Dahne
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General Engineering Co.
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MASSACHUSETTS

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Newark:
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Elec. Service & Sales Co.
Leslie Hughes



Write for your copy of bulletin EX-7500, describing and listing this new fixture in detail. Your copy will be mailed at once.

BENJAMIN TRADE MARK

EXPLOSION PROOF FIXTURE

listed

**By Underwriters'
Laboratories**

for Class I, Group D Hazardous
Locations

Benjamin announces an Explosion Proof Lighting fixture of new and radically different design built to meet the long-standing need for a fixture combining improved quality of illumination with dependable protection against explosion hazards.

Exceptional strength in every part and the use of deep-threaded, metal-to-metal joints, enable this fixture to withstand repeated internal explosions without breaking down or permitting flame to escape.

Among the outstanding design features of this new Benjamin fixture is the method of entirely enclosing the reflector within the body of the unit. The improved heat radiating efficiency of this design, made possible by the heavy ribbing of the aluminum body and the absence of an exterior reflector to restrict the free circulation of air about the fixture, assures that the temperatures of exposed surfaces are safely below the danger point of igniting the surrounding atmosphere.

The non-tarnishing, aluminum alloy reflector is unique in design and of permanent high efficiency. It is protected by a heavy, heat-resisting cover glass; wiping its smooth outer surface cleans the fixture. The separable hood of the fixture carries a one-piece porcelain socket with conventional wiring terminal connections. A removable screw plug in the hood gives access to the wiring. The fixture accommodates 150 and 200 watt lamps.

BENJAMIN ELECTRIC MFG. COMPANY
DES PLAINES (Chicago Suburb), ILLINOIS

WHAT THE bending test showed!



● In conducting tests to determine the relative bending qualities of various threaded electrical conduit, the testing laboratory discovered a very important advantage in Fretz-Moon Conduit. ● The illustration above—an unretouched photograph—shows what happened in making test bends. Note the perfect bend made by the Fretz-Moon Conduit at the top. Then note the distortion and flattening at the bend in the ordinary conduit at the bottom. ● Fretz-Moon Conduit always makes perfect bends without loss of inside diameter—and without damage to the protective inner or outer finishes. This means easier and faster running of wires, and long service life. ● Write for further information on Fretz-Moon Easy-Bending Conduit—the conduit that bends 25 per cent easier than ordinary conduit.

STEEL AND TUBES, INC.
CLEVELAND • OHIO

EXCLUSIVE SALES AGENTS

FRETZ-MOON
 **Rigid conduit**



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(Continued from page 26)

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S. & S. Supply Co.

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J. W. Broadfoot Co., Inc.
Wollenberg Elec. Co., Inc.

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Schenectady:

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OHIO

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The General Service Co.

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Daylight Elec. Co.
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Explosion-Proof Pit Lights and Floodlights

Type RCDE-8 Pit Lights and Floodlights are carefully designed to meet the exacting requirements of the Underwriters' Laboratories for use in hazardous locations.

The Pit Lights are recommended for lighting automobile greasing pits and lifts; also for general use in hazardous locations. They are tapped for $\frac{3}{4}$ inch conduit.

The Floodlights are recommended for use around oil refineries and chemical plants, and for lighting spray booths from the outside. They can be furnished with trunnion mounting or as portable units.

Catalogs sent upon request.



Floodlight



Pit Light



Portable Floodlight



CROUSE-HINDS COMPANY

SYRACUSE, N. Y., U. S. A.



CH578

CONTRACTING news

INFORMATION OF INTEREST TO ELECTRICAL CONTRACTORS
CONSISTING OF ITEMS OF NEWS, SHORT ARTICLES, PRACTICAL
IDEAS, ETC., OUR READERS ARE INVITED TO CONTRIBUTE TO
THIS DEPARTMENT

CONTRACTORS AND WHOLESALERS REACH AGREEMENT

As the result of a meeting in Minneapolis on November 8 of the trade relations committee of the Minnesota Electrical Council and a committee from the electrical wholesalers operating in that territory, an effective working plan was developed for reaching agreements on points of issue between the contracting and wholesaling branches of the electrical industry.

It is announced by the Minnesota Electrical Council that agreement has been reached on the following principles:

(1) That the wholesalers are substantially in accord with the work and aims of the council, and will appoint a committee to work with its committee on all matters which may have to do with relations toward each other.

(2) That the policies of the wholesalers will be brought into line with recommendations we have made, as fast as code provisions and mutually satisfactory arrangements can be made, on the following propositions in particular:

(a) A satisfactory differential or price protection to contractor dealers on all materials sold to industrial consumer accounts.

(b) Provisions in the wholesale code, eliminating merchandise and appliance sales to consumers at wholesale prices.

(c) To control the sale of residential and commercial lighting fixtures to and through contractor dealers for resale at retail prices.

(d) To work for increased maximums in establishing Mazda lamp agencies and form "E" contracts so

that this business may again become profitable to contractor dealers, and to abolish the 10 per cent retail discount on cartons of six (6) lamps.

(e) Greater credit restrictions on old and new accounts to prevent un-economic competition.

(f) To fight the unfair discrimination of manufacturers and others

ELECTRICAL CONTRACTING'S THIRTY-THIRD YEAR

ELECTRICAL CONTRACTING now enters its thirty-third year having been started in 1901 by the National Association of Electrical Contractors under the name of the *National Electrical Contractor*. When merchandising began to play an important part in the business, the name was changed to the *National Electrical Contractor and Dealer*. The Association changed its name in 1921 to The Association of Electragists and the magazine accordingly became known as *The National Electragist*, later shortened to *The Electragist*. In 1928 the magazine was purchased by Electrical Trade Publishing Company, the present publishers, and with that the name was changed to ELECTRICAL CONTRACTING.

In the Spring of this year *Electrical Record*, previously known as *Electrical Installation Record* and then *Electrical Installation*, was purchased and consolidated with ELECTRICAL CONTRACTING. The publishers of ELECTRICAL CONTRACTING have retained all rights to any and all names previously used by this magazine, or any magazine that has been merged or consolidated therewith.

who sell to chain stores at prices below those current to wholesalers and contractor-dealers.

(g) To publish catalogs carrying resale list prices, and to distribute net price lists and discount sheets only to contractor-dealers who are entitled to receive same.

(3) That the wholesalers and contractor dealers agree that the interests of both are identical in working out necessary reforms in distribution and sales policies.

DETROIT ORGANIZES ELECTRIC CLUB

The Electric Club of Detroit has recently been organized by the electrical industry of that city with headquarters at the Hotel Book-Cadillac. The club asked that all electrical men visiting Detroit make the club rooms their headquarters. F. H. Van Gorder is secretary and manager.

The Detroit Electric Club has just instituted a publicity and educational campaign to the public and dealers to create a demand for only approved and safe electrical devices. The initial work will be done in connection with the identified cord movement.

CREDIT INFORMATION ON PUBLIC WORK CONTRACTORS

With the Public Works Program getting under way electrical contractors in every section of the country will be asked for bids by general contractors unknown to them. In a great many cases in the past electrical contractors have had difficulty in collecting for their work on government projects, especially as they cannot file mechanic's liens.

For the past four years there has been operated in Washington the Bureau of Contract Information, Inc., a non-profit fact finding organization for the purpose of providing information to bidders on construction projects. The bureau has established a nation-wide interchange of information between those awarding private construction contracts, those writing surety bonds, financial institutions, and all interests extending credit to the construction industry.

As a result of this interchange of information the Bureau has been able to accomplish the following:

First: Fifteen hundred and thirty-nine (1,539) individual reports show-



• • • Combines the assurance of a permanent electrical installation with ease of installing - a combination only the highest grade of standard weight rigid steel conduit can give you.

Adaptable to every type of building construction and occupancy.

THE YOUNGSTOWN SHEET AND TUBE COMPANY
General Office — YOUNGSTOWN, OHIO
Manufacturers of Carbon and Alloy Steels

BLACK ENAMELED - ELECTRO or HOT DIPPED GALVANIZED

YOUNGSTOWN BUCKEYE CONDUIT

PROFIT BY USING GREENLEE TOOLS

THE greater the efficiency of the tools you use, the more chance you have for meeting competition and for making a profit on each job. That is where Greenlee Conduit Benders and Knockout Tools come in. They cut costs on every job where they are used.



Hydraulic Conduit Benders

Greenlee Hydraulic Conduit Benders insure profits because they bend conduit quicker and easier than by other methods. In addition, they make smooth, even bends, eliminating many fittings and making it easy to pull in wire. They are easy to take to the job, too, because they are portable.



Knockout Tools

Greenlee Knockout Punches and Cutters make it easy to enlarge holes in switch boxes, cabinets, etc. They form clean-cut holes quickly and accurately, without any reaming or filing.

Other Tools

Hydraulic Pipe Pushers

Joint Bore

Bit Extensions

Electrician Bits

Let Us Send Complete Information

GREENLEE TOOL CO. ROCKFORD ILLINOIS

GREENLEE TOOL CO.
ROCKFORD, ILLINOIS

Please send complete information on the following

- ☐ Conduit Benders
☐ Knockout Tools

Name

Street

City

State

My jobber is

12-33

ing defaults, bankruptcies, complaints regarding non-payment of bills for labor and materials, suits filed and general unfavorable information on 726 individual contracting concerns throughout the United States. These notices disclosed 822 defaults on individual construction contracts, composed of 337 in building construction and 485 in engineering construction.

Second: Eighty-three per cent of the total concerns on whom unfavorable information was reported were by contracting concerns which had failed to voluntarily or upon request file their Performance Records with the Bureau.

Third: More than 78 per cent of all defaults, during 1931 and 1932, on construction contracts awarded for building and engineering construction by the federal government and on highway construction by all of the state highway departments throughout the United States, were by contractors who had failed to file their Performance Records with the Bureau.

Fourth: From the organization of the Bureau late in 1929 to the end of 1932, 769 individual construction projects were awarded to other than low bidders through the determination and disclosure of lack of qualification, including irresponsibility, by the Bureau to those responsible for the award of contracts.

WISCONSIN'S EIGHT YEAR ELECTRICAL FIRE RECORD

The table for fire losses due to electrical causes in Wisconsin during 1932 as reported in the annual review of the Wisconsin Electrical Inspectors Association amounted to \$816,649, of which \$760,437 or more than 90 percent was charged to defective wiring.

These figures have been combined

with reports from the previous seven years as compiled by the Statistical Committee of the Association and will be found in a table on this page. The material for these reports was obtained from the report of the State Fire Marshal who gathered the data from the local fire departments or town administrators.

In asking John E. Wise, electrical engineer for the State Industrial Commission to comment on these figures, he stated:

"Our state superintendent of fire prevention states that there are two of the so-called 'guess causes'—spontaneous combustion and electrical wiring. Due to the fact that in the last few years there has been more electrical wiring installed in rural district there has been more opportunity for town clerks to report fires in buildings which are wired. It would seem, therefore, that there may be more of these fires which are of unknown origin which have been reported as of electrical origin. I mention this simply to call attention to the fact that the increase in fires due to electrical origin may not be entirely correct. There is no question, however, but what there are a large enough number of fires which are due to electrical causes."

SEPARATE LICENSE FOR ONE-MAN SHOPS

Ottawa, Canada, in its new license fees recognizes a difference between one-man contractors and employing contractors. The new fees as approved by the Board of Police Commissioners, which have been raised from a flat fee of \$1.00 per year for all licenses, are now on a graded system as follows: \$3.00 for an electrician; \$10 for a contractor electrician, and \$30 for a company contractor.

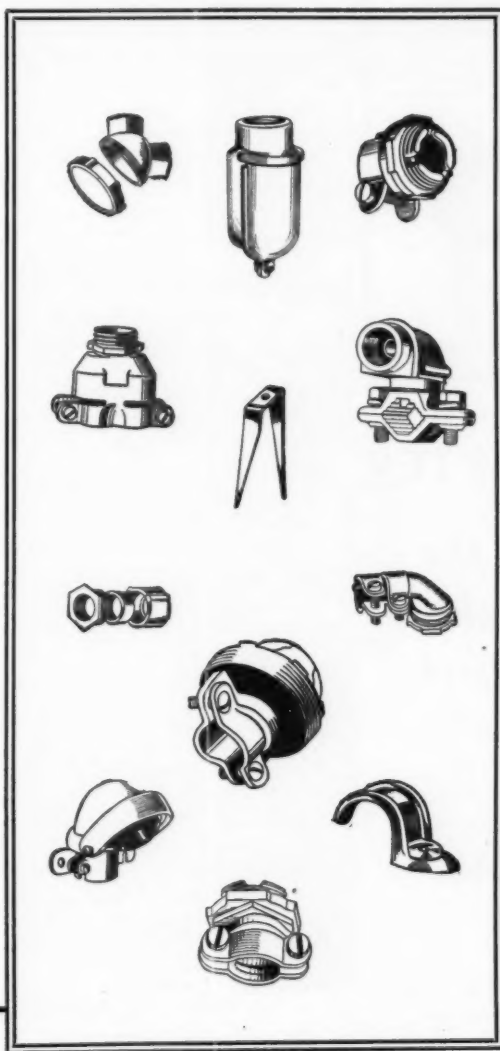
Dollar Fire Loss in Wisconsin for Past Eight Years

Causes	1925	1926	1927	1928	1929	1930	1931	1932
Curling Irons.....	\$ 395	\$ 135	\$ 525	\$ 300	\$ 115	\$ 1,956	\$ 244	\$ 98
Flat Irons.....	22,495	19,150	19,635	14,170	34,081	38,088	6,280	17,180
Hair Driers.....						88		95
Heaters.....	8,885	1,025	2,065	3,040	11,805	360		3,740
Heating Pads.....	55	445	485	125	925	252	134	623
Elec. Percolator.....				50				683
Toasters.....								0,000
Elec. Appliances.....	\$ 31,830	\$ 20,755	\$ 22,770	\$ 17,686	\$ 46,920	\$ 40,744	\$ 6,658	\$ 31,419
Defective Motors.....	36,485	28,265	6,011	875	40,211	122,776	36,474	24,693
Electric Ovens.....	12,000				643			
Electric Stoves.....						4,725		100
Electric Lamps.....				145				
Defective Wiring.....	1,686,467	792,783	156,600	599,182	752,400	1,188,502	940,302	760,437
TOTALS.....	\$1,115,782	\$541,803	\$185,351	\$617,888	\$840,180	\$1,356,747	\$982,434	\$816,649

Never heard of STERLING FITTINGS?

... You'd be surprised


to know how many years you've been selling and installing them! And giving them your personal O. K. Because they are everlastingly well made.



The only thing new about them is that you can now buy them from their real maker. For years we have been making Sterling Conduit Fittings for other manufacturers who have sold them to you under their own names. We've reason to feel proud of a line that's given such long and genuine satisfaction—and it seemed about time that our own name was on it. Certain provisions of the NRA and the Electrical Code now make this step wise and practicable.

We suggest that on your next order for conduit fittings you specify Sterling. Look for the Sterling mark—your guarantee of careful design, expert workmanship, and finest quality. All fittings cadmium plated and attractively packaged.

If you are unable to secure Sterling Fittings through your accustomed source, send us your jobber's name and we will see that you are supplied at once. Write today for catalog.

STERLING  QUALITY

APPROVED BY UNDERWRITERS LABORATORIES

THE STERLING MANUFACTURING CO.
STRATFORD CONN.

Makers of "Sterling" Quality Fittings

BUILD GOOD - WILL IMPROVE YOUR PROFITS

With RALCO PRODUCTS. They make the job easier for you and give Dependable Satisfaction to your customer



52-EP

The No. 52-EP Approved Interlocking Receptacle, Plug and internal switch is used for Hazardous Locations (Article 32) where explosive dusts or vapors are present as in Grain Elevators, Flour Mills, Paint and Varnish Factories, Rubber Cement Plants, Dry Cleaning Plants, etc.

**RALCO Explosion-proof
Approved Junction
Boxes and Fittings for
Gas Service Stations.**



XPU-7

RALCO Receptacles and Plugs for jobs that require Durable and Dependable service give true value at an economical cost.



Type AN Recept.

See your Jobber for full information or write us for Bulletins.

RALCO MFG. CO.
125 No. Albany Avenue
Chicago - - - Illinois



Type PAN Plug



The SIGHT METER

*it makes the
sale of light-
ing jobs easy!*

You can now actually show a customer why he needs new lamps, larger lamps, a better lighting installation. The sight meter measures light in terms of sight.

**Low enough in price so every
contractor can afford one.**

BETTER LIGHT—BETTER SIGHT

Actual size
Weight 8 oz.
Lifetime service

Write for Data
to
The Sight Light Corp.
CHRYSLER BUILDING NEW YORK, N. Y.

FREE RANGE WIRING NOT NECESSARY

Some interesting statistics can be gathered from the results of the recent National Electric Cookery Council range sales campaign.

Free range wiring apparently is not necessary to stimulate range sales for out of the four local cookery council contest winners, Richmond, Va., fourth prize winner, only had a full free wiring policy. The first and second prize winners, Reading, Pa. and Poughkeepsie, N. Y., had a policy where the customer pays for the wiring in the installed price of the range. Buffalo, winner of third place, charged the customer in a part of the territory and in the balance of the territory the utility absorbed the wiring.

In the utility commercial managers contest in Alexandria (first) the utility absorbed \$25.00 and the customer the balance of the wiring cost; in Providence, R. I., range wiring was free but in Boise, Idaho, (third) the customer paid for the wiring in the price of the range.

The winner in the range dealers contest is located in Pittsfield, Mass., where range wiring was free.

Another interesting point was the percentage of sales by dealers. In Reading, for instance, the percentage was 41 and in Alexandria 40.

One further point that may have no bearing but nevertheless is interesting is that except for the fourth place winner in the utility commercial managers contest all the winners were in eastern seaboard states.

CONTRACTOR ON SOUTHERN CALIFORNIA LABOR BOARD

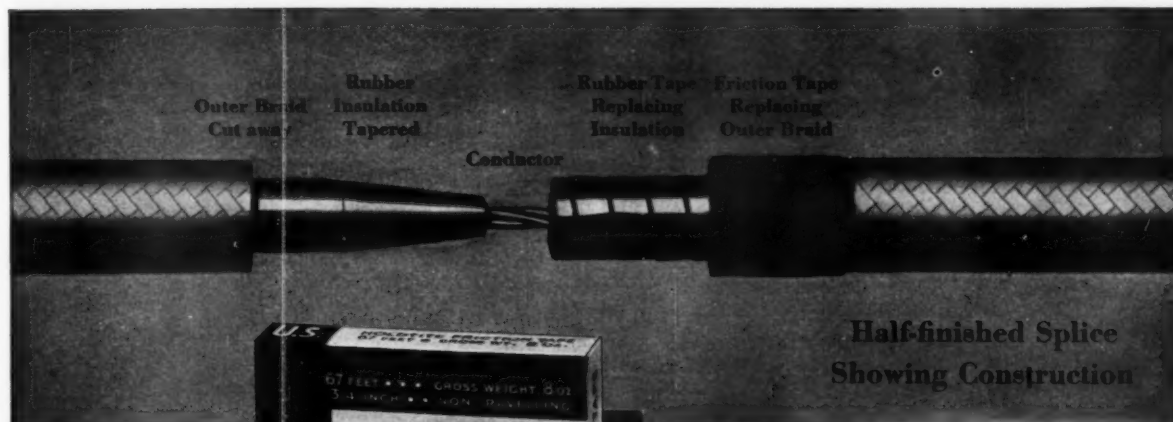
The National Labor Board carried in its announcement of the appointment of the Southern California Regional Labor Board the name of an electrical contractor, Arthur S. Bent, president, Bent Brothers, Los Angeles, as a member representing industry.

WINDOW LIGHTING CAMPAIGN TO STIMULATE BUSINESS

The Electric Association of New York is conducting during the first nine days of December a "Buy Now" show window contest that is open to all stores belonging to civic or trade associations in the metropolitan area.

This contest which is being operated to tie-in with the local N.R.A.

A Workmanlike Splice



A workmanlike splice deserves good tapes. Use "U. S." Relio Rubber tape and "U. S." Hold-tite or Security Friction tapes.



THE United States Rubber Company, world's largest producer

of rubber, offers you a line of tapes you can depend upon—tapes that insulate and hold as long as the wire itself.

Most of the better suppliers handle these tapes, but if your supplier cannot fill your order, won't you send us his name, or phone the "U. S." Branch nearest you, so we can take steps to assure you of prompt service in the future?

United States Rubber Company

1790 BROADWAY  NEW YORK CITY

Stocks in all Industrial Centers

HUNDREDS of USES

for NEON GLOW LAMPS

And a size just right for each

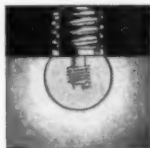
Neon Glow Lamps have hundreds of uses, and new ones are turning up every day. As night or indicator lights in the home. Exit lights in theatres, offices and factories. For signal or pilot lights, for testing, and many other purposes. They cost little to begin with and are low in operating cost throughout the whole of their long life. Their low level of illumination is ideal for their many uses. Dealers will find it profitable to stock the full line. Neon Glow Lamps are becoming increasingly popular. For full details on prices and sizes, address General Electric Vapor Lamp Company, 867 Adams Street, Hoboken, N. J.



3-Watt Bulb S 14
Finish — Clear
Sprayed red or
yellow



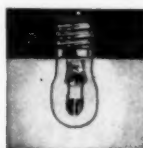
2-Watt Bulb S 14
Finish — Clear
Sprayed red or
yellow



1-Watt Bulb G 10



0.5-Watt Bulb G 10
Supplied in 1.0-Watt
for 220, 230, 240
Volts



0.25-Watt Bulb T4J
Supplied with Can-
delabra Base Only

GENERAL  ELECTRIC
VAPOR LAMP COMPANY
573 Corp., 1933, General Electric Vapor Lamp Co.

Beating Competition with Brains

Competition is tough in the electrical contracting business these days; and every day it gets worse. Successful contractors have found they can beat fly-by-night competition best by using their brains, and by educating their responsible employees. You can help your head men to keep abreast of the times and save you money by sending each his own copy of **ELECTRICAL CONTRACTING**.

activity to stimulate business offers an engraved cup to the winning store in each of the three boroughs.

The rating of the windows will be on the following basis: Attracting power (20 points), artistry in arrangement (20 points), identification of the merchant (10 points), sales appeal of the merchandise (20 points), and correctness of lighting (30 points).

ESSEX LEAGUE ELECTS OFFICERS

The annual election of officers of the Essex Electrical League held on November 9 was as follows:

President, John Caffrey Jr., Buhl & Caffrey Inc., Newark; vice-president, Robert Beller, Beller Electric Supply Co., Newark; treasurer Richard H. Osgood, Hazard Insulated Wire Co., New York; secretary, James H. Stapleton, Public Service Electric & Gas Co., Newark.

MINNEAPOLIS LIBERALIZES CIRCUIT BREAKER WIRING

A number of changes have been made in the Minneapolis ordinance liberalizing the rules with regard to outlets, circuit breakers and services.

Except for non-residential buildings having but one circuit where No. 10 may be used, the minimum service required is No. 8 in 1-in. conduit.

Fuse protected circuits shall not have a maximum wattage in excess of 1,000 watts while for circuit breaker protected circuits 1,650 watts are permitted.

Circuit breakers are required in place of meter switches for installation of over 400 amp.

Not more than ten outlets or more than forty sockets are permitted on a branch circuit except where such circuits are protected by circuit breakers when the maximum number of outlets permitted is increased to twelve.

The new ordinance also establishes a fee of 25 cents for inspection of three outlets or sockets or a bell transformer of not more than 100 watts when this wiring is added to existing installations.

NORTH TO RECEIVE McGRAW AWARD FOR CO-OPERATION

J. E. North, director of the Cleveland Electrical League, has been selected to receive the James H. McGraw Award for co-operation. The presentation will be made on December 13.



The CORD SET

**GUARANTEED TO LAST
PACKAGED TO SELL!**



This NEW CORD SET comes to you as a profitable merchandising proposition. Sales-appeal is brought to the front in an attractive, colored Display Package which sells the sets. . . Each display holds 10 Cord Sets, individually packed with written one-year GUARANTEE. Each set has SCREWLESS Bakelite Heater Plug, held together by spring clips; cannot loosen. . . Here's Quality dressed up for quick sale and priced to give you an unusual merchandising profit. Ask your Jobber's salesman or write us for sales proposition.



HART & HEGEMAN DIVISION
THE ARROW-HART & HEGEMAN ELECTRIC CO. HARTFORD, CONN.

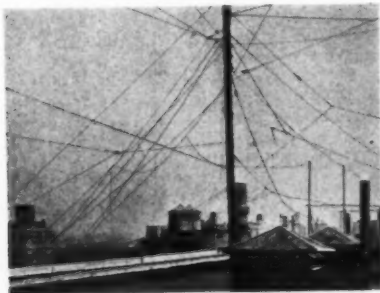
One perfect

ANTENNA

With the RCA Victor
Antenaplex System

FOR THE ENTIRE
BUILDING

or this MAZE



Progressive owners and managers of large and small buildings alike know the advantages of clear and efficient radio reception for their tenants.

THE RCA VICTOR ANTENAPLEX SYSTEM SOLVES THE PROBLEM FOR THE MULTI-FAMILY DWELLING

This new field offers unusual opportunities for the progressive electrical contractor—as simple and inexpensive to install as an annunciator system—as important in the modern building as the telephone system. Investigate the possibilities of this up-to-the-minute improvement.

It means profits for both the contractor and the owner—with everlasting satisfaction for the occupants.

Send for loose leaf booklet
in convenient pocket size binder—
it contains a wealth of information



Centralized Sound Section

RCA VICTOR CO., Inc.
CAMDEN, N. J.
"Radio Headquarters"

NEWS MANUFACTURERS

A DEPARTMENT FOR THE ANNOUNCEMENT OF ACTIVITIES OF MANUFACTURERS THAT ARE OF INTEREST TO CONTRACTORS, SUCH AS CHANGES IN EXECUTIVE PERSONNEL, BRANCH OFFICES, NEW PRODUCTS, ETC.

G. E. ANNOUNCES BARE NEUTRAL ENTRANCE CABLE

After working for many months in cooperation with the Association of Edison Electric Illuminating Companies in the manufacture of the concentric wiring system sponsored by that association, the General Electric Co. announces, through its Merchandise Department, that it has developed a bare neutral service entrance cable of the concentric wire principle. The new entrance cable, which is designated by the initials of the association, A.E.I.C., has been approved by Underwriters' Laboratories.

This new service entrance cable which is for use from the point of attachment of service wires to the service entrance switch, is an armored weatherproof cable designed for durability in all climates. The bare conductor in the form of strands concentrically wound and equally applied over the insulated conductors is immediately covered by a metallic armor. This construction, it is stated, introduces new engineering principles embodying conductivity and non-theft features desirable in this material.

The General Electric Company, in its announcement, states that this entrance cable not only combines extreme flexibility with maximum mechanical protection but that the clean armor, resulting from an easy stripping insulation, insures a perfect mechanical and electrical band.

The outstanding features of this cable are stated to be as follows:

1. Greatly reduced weight and size over the present type of service entrance cable.
2. Conductors are easily identified by distinctive colors.
3. Assembled armor and conductors are clean since no pitch is used in assembly.
4. Conductors require no cleaning with solvents before making connections.

5. All conductors are stranded, resulting in an extreme flexible cable.

6. Bare conductor is concentrically wound.

7. Theft-proof assembly.

8. A slight pull with the hand removes the armor—no hacksaw is necessary.

9. All weatherproof outside of armor and conductor assembly. This armor receives same weather protection as conductor.

10. Overcoat easily laid back without soiling the hands.

11. Fittings are attached over the weatherproof covering. This saves time in installation and eliminates the possibility of moisture penetration.

12. Will take any kind of ordinary house paint.

For fittings a metal strap in the entrance cap provides a ground by clamping tightly over the armor and conductor. The entrance cap also provides two split insulating bushings thus eliminating the threading of wire through the bushings. The entire cable passes through the new connector and a soft rubber bushing clamps it tightly around the overcoat in order to create a weatherproof connection.

ENAMELED METALS APPOINTS CAMPBELL SALES ENGINEER

Enameled Metals Co., Pittsburgh, Pa., announces the appointment of William G. Campbell sales engineer. Mr. Campbell has been prominently identified with the conduit business, and for several years was chairman of the Exhibition Committee of the National Electrical Contractors Association.

CURTIS LIGHTING ISSUES NEW HANDBOOK

Curtis Lighting, Inc., Chicago, Ill., has just issued a 90-page handbook and reference manual and catalog that shows many ways in which standard equipment can be used for

A typical advertisement of the Westinghouse National Campaign on Nofuze Industrial Circuit Breakers.

Your
CUSTOMERS
are learning about
FUSELESS
PROTECTION

Westinghouse

Quality workmanship guarantees every Westinghouse product



Safer

LOWER-COST

CIRCUIT PROTECTION

with

Nofuze Circuit Breakers

Westinghouse Nofuze Breakers eliminate fuses in the protection of plant wiring circuits. Available in ratings up to 600 amperes, 480 volts a-c, and 250 volts d-c.

THE Westinghouse Nofuze Industrial Circuit Breaker, which replaces the conventional fused safety switch, is absolutely safe for anyone to operate. After an overload, a mere flip of its handle restores power instantly.

All live parts are totally enclosed. There are no blown fuses to be removed and replaced... no testing or experimenting is required to locate the open circuit. The handle of the breaker in its "TRIPPED" position indicates the open circuit.

You can have fuseless circuit protection at surprisingly low cost.

Investigations made in several average plants show that money spent on fuses, and the cost of time wasted by idle men and machines when fuses blow, will pay for equipping a plant with fuseless protection in a very short time.

Check Fuse Wastes this Easy Way

Check this waste in your plant! A supply of Fuse Check Books, which makes it a simple matter to keep fuse-usage cost records, will be sent on request. Let your own records show you how Nofuze breakers will soon repay their cost.

With the Nofuze Breaker, after an overload opens the circuit, stopping a machine, a mere flip of the breaker handle restores service.

This check book makes it easy to keep an accurate record of lost time and money caused by blown fuses in your plant.

SEND FOR CHECK BOOKS

Westinghouse Electric & Manufacturing Company
Room 2-N—East Pittsburgh, Pa.

Gentlemen: I would like to investigate the fuse cost. Please send the Fuse Check Book on Low Cost Circuit Protection and copies of Fuse Check Books.

Name.....
Company.....
Position.....
Address.....
City..... State.....
T 79699
FEBRU 1934

A national campaign of Westinghouse advertising is now carrying a convincing, selling message to your industrial customers about the lower cost and greater safety of fuseless wiring protection from excessive overloads and short circuits.

This advertising offers plant owners an easy means of checking their fuse losses. It points out that obsolete circuit protection costs thousands of dollars yearly in the average industrial plant and shows how Nofuze industrial circuit breakers will soon pay for themselves out of savings.

Take advantage of the wide-spread interest this campaign is arousing in low-cost circuit protection. Get your customers to check their fuse losses and you have gone a long way toward selling Nofuze Breakers, and getting new wiring business.

Mail the coupon today for information that will enable you to get a profitable share of this new business.

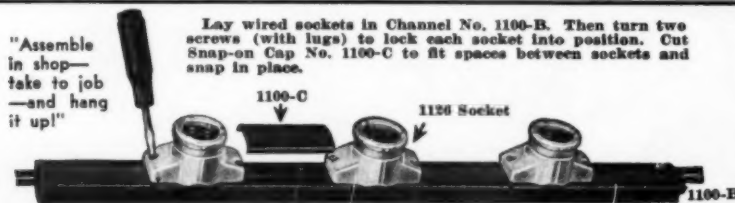
SEND FOR INFORMATION

Westinghouse Electric & Manufacturing Company
Room 2-N—East Pittsburgh, Pa.

Gentlemen: Please send me information on your new plan for selling Nofuze Industrial Circuit Breakers.

Name.....
Company.....
Position.....
Address.....
City..... State.....
T 79699
EC 12-33

"Better Light—Better Sight!"



THIS lighting strip is one of the many practical Wiremold methods for providing better light—*simply and economically!*

WIREMOLD

HARTFORD, CONN.



WHEN IS A TAPE *NOT* A TAPE?

IT'S easy to think that "tape is just tape." It's easy to accept the first tape that's offered. But there's a difference between tapes and sometimes this difference is very marked.

Tape is really **not** a tape, for instance, when it lacks or when it loses tensile strength, adhesiveness or any of the other properties a friction tape should have. And when you put Panther and Dragon Tapes to the tests for tensile strength and for adhesion—both before and after ageing—you will see what a difference these properties can make.

They are tapes, in fact, which are not only different in their properties, but different in appearance. They do not even look like other tapes. Wrapped in glistening cellophane to keep them fresh, with a distinguishing green core that marks them apart even when the roll is partly used, Panther and Dragon not only hold first rank in tapes, but **look the part.**

Hazard Insulated Wire Works
Division of
The Okonite Company
Passaic, N. J.

producing regular or unusual lighting effects. In addition, it gives sales ideas which may be used in specifying or selling this lighting equipment. The book contains a large number of illustrations that show new and unusual uses for X-Ray window reflectors, LightStrip, CurtiStrip, interior floodlights, general lighting reflectors, etc., and a complete new section on recessed lighting equipment. Scaled detail drawings and suggested specifications are included.

STERLING TO SELL FITTINGS UNDER OWN NAME

The Sterling Manufacturing Co. of Stratford, Conn., have for several years manufactured electric conduit fittings for other manufacturers of wiring devices who required fittings to complete their lines. This policy will be continued but it will be augmented by a sales campaign through the recognized jobbers to stimulate a further demand for Sterling fittings under the name, package and label of the original manufacturer.

WESTINGHOUSE LAMP COMPANY ANNOUNCES PROMOTIONS

The Westinghouse Lamp Co., East Pittsburgh, Pa., announces the appointments of Harold S. Broadbent as manager and DeNyse W. Atwater as assistant manager of the commercial engineering department.

Samuel G. Hibben has been appointed as director of lighting for the company.

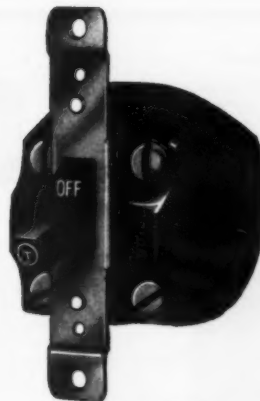
Messrs. Broadbent and Atwater were assistants to Mr. Hibben during the 15 years he was manager of commercial engineering.

General Electric Co., Schenectady, N. Y., has published bulletin GEA-1804 covering indicating lamps, complete with receptacles, resistors and color caps. The bulletin contains illustrations showing each part of the unit, together with ratings and dimensions.

The first issue of "The Louis Allis Messenger," a magazine published by The Louis Allis Co., Milwaukee, Wis., has just been released. This booklet is published bi-monthly for those interested in the purchase of maintenance of electric motors. Louis Allis motors are fully described in this publication and each unit is illustrated.



Cat. No. 2228
(2½" x 4" x 2½")



Cat. No. 2228-S
Switch Unit in
Bakelite Case

Announcing...

A New 2 H. P. Heavy Duty Tumbler Switch—Type "R. B."—For Motor and Lighting Circuit Control

Built to withstand heavy electrical overloads and surges "R.B." tumbler switches also stand up under hard mechanical knocks. Use these new style switches for control of small motor-driven machines or lighting circuits and you have a satisfied customer.

Maximum rating, 2 H.P. at 250-600 volts. Holes are drilled in the handle guard so that the switch can be padlocked in either "on" or "off" position.

FEATURES:

- "RB" Type Roller Contact provides greater rupturing capacity and longer life.
- Self lubricating roll contact.
- Switch unit in bakelite case.
- 2 Pole and 3 Way units fit standard wall box.
- Can be padlocked in "on" or "off" position.
- Operating handle protected by a guard.
- "Shake-proof" lock washers under switch unit mounting screws.
- Box with rounded corners, electro galvanized.
- Neat in appearance, compact in design.

- Ample wiring space.
- Quick-make and Quick-break.
- Surface or Flush mounting.

RATINGS:

2 Pole
30 Amp., 250 V.; 5 Amp., 600 V.
2 H.P., 250-600 V.

3 Way
10 Amp., 125 V.; 5 Amp., 250 V.

4 Pole
30 Amp., 250 V.; 5 Amp., 600 V.



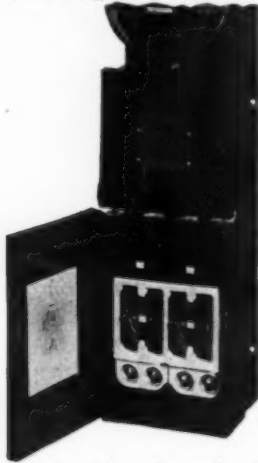
THE TRUMBULL ELECTRIC MFG. CO.
Plainville, Conn.

A GENERAL ELECTRIC ORGANIZATION

December New Products

Distribution Panel

Bull Dog Electric Products Co., Detroit, Mich., announces a new sequence main service distribution panel, known as Cat. No. 551204, consisting of main service switch, range switch and lighting circuits in one cabinet. Heavy main service and range wires enter and leave



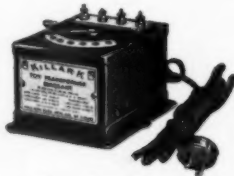
at the same end and smaller lighting circuit wires at the other end. Top and bottom wiring gutter space has been proportioned accordingly and side space conserved, thus eliminating side or cross-over wiring. Dimensions of panel are 7½ in. wide by 12 in. high. Panel may be installed as a separate unit or combined with indoor meter sequence box. Other features are the use of Bull Dog solderless cable connectors that are standard with device and the quick and easy plug fuse circuit wiring connectors.

Gear and Wheel Puller

The Steelgrip universal gear and wheel puller, consisting of a heavy bracket with large pulling screw and three chains of most any length, is announced by Arm-



strong-Bray & Co., 308 Sheldon St., Chicago. The chains are doubled ended, with standard chain hooks for gripping around spoked wheels or large gears on one end and special hooks that take a close grip for bushings, small gears, motor pulleys or in close quarters. Pullers come in two sizes, with pulling capacities of 6,000 or 24,000 pounds.

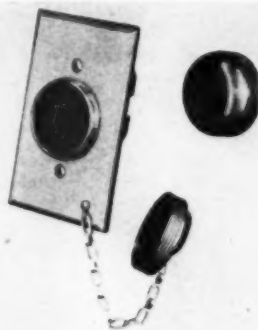


Toy Transformers

Killark Electric Mfg. Co., St. Louis, Mo., announces a line of toy transformers to operate on 110 volt, 60 cycle, a.c., with air-circulating base for mounting to table or board. Catalog No. 1016-75, trade-name "Sargent" is 75-watt size, 3 section secondary winding, 3 to 8, 9 to 14, and 15 to 20 volts. Voltage advance in steps of one volt. Catalog No. 1016-100, trade-name "Captain" is 100-watt size, has three fixed voltages for operation of train lamps in addition to variable voltages through the control lever. Catalog No. 1016-150, trade-name "Major" is 150-watt heavy-duty transformer for operation of trains, motors, Christmas tree lamps, erector sets, etc.

Weatherproof Outlet

The merchandise department of General Electric Co., Bridgeport, Conn., has added a weatherproof outlet for the use of outdoor lighting fixtures and ap-



pliances to its line of wiring devices. Unit is made of brass and cadmium coated. Flush plate has a solid rubber pad mounted on back. A cap slips over cord plug and screws onto the device. Another rubber-insulated cap, changed to flush plate of outlet, screws tightly over outlet when not in use.

Conduit

Conduit, designed to meet the most rigid requirements of underground electrical service, is announced by the Goodyear Tire & Rubber Co. This product will be marketed exclusively by the Graybar Electric Co. and will be known as Goodyear-Graybar conduit. No rubber is used in the manufacture of this conduit, but cotton fibers together with specially developed compounds are bonded into a homogeneous mass. There are no compounds present which will cause deterioration of rubber covered or weatherproof wire, lead sheaths of cables, copper or steel, it is stated by the manufacturer.

Other features of this conduit are its high resistance to water absorption; definite fire resistance; high impact and crushing strengths making breakage negligible even at low temperatures; does not exude oils or impregnating compounds, thereby eliminating the possibility of cables becoming imbedded in the compound of the duct at extreme overload temperatures. Inside surface is smooth and glossy. As the coefficient of friction is low, cable pulling strains are greatly reduced and longer pulls are possible without danger of abraiding or slipping lead sheaths of cables. Material can be furnished in units from 5 to 8 ft. in length, with inside diameters running from 1 to 6 in.

Panelboards

Square D Co., Switch & Panel Division, Detroit, Mich., announces Saflex, Jr. panelboards for power feeder installations where circuits do not exceed 100 amp., 250 volts. These panels, obtainable for either flush or surface



mounting, are mounted in cabinets 6 in. deep and 19 in. wide. 30 and 60-amp. circuits are available in either twin or single units, while 100 amp. circuits are manufactured in single units only. Panels are dead-front, convertible and individual circuits can be locked in either on or off position. Unit doors are opened or closed by means of cam action handles.



Cartridge Fuse

Royal Electric Co., Avon, Mass., has placed on the market a cartridge fuse with insulated handle known as Royal Handle Cartridge Fuse. Handle is fastened around the fuse and turns freely, which manufacturer claims makes it possible to insert and remove fuse at any angle. Fuse can also be snapped in and taken out of a block and no need for finger space or for use of fuse pullers or other tools.

Electrical Contracting, December, 1933

BRYANT "IL" SWITCHES

IL61—Single Pole
IL62—Double Pole
IL63—Three-Point
IL64—Four-Point



IMPORTANT FEATURES

- 1—Fully enclosed mechanism.
- 2—Satisfactory on type "C" lamp circuits.
- 3—Fits STANDARD Brass and Composition plates.
- 4—Generous wiring room.
- 5—Different switch combinations in 2 or 3 lever arrangements.
- 6—Electrically connected combinations in one case ready for installation.
- 7—Economical in cost and installation.

THE ELECTRICALLY CONNECTED COMBINATIONS ARE

IL611—Two Single Pole
IL613—One Single Pole, one Three-Point
IL633—Two Three-Point
IL6113—Two Single Pole, one Three-Point

Each unit in combination rated same as corresponding single switch.

"TEPLUS" PLATES FOR CONNECTED COMBINATIONS ARE

IL12—One Gang, Two Openings
IL13—One Gang, Three Openings
IL24—Two Gangs, Four Openings
IL26—Two Gangs, Six Openings

EC 1233

BRYANT



SUPERIOR WIRING DEVICES

Manufactured by THE BRYANT ELECTRIC CO., BRIDGEPORT, CONN.

MANUFACTURERS OF "SUPERIOR WIRING DEVICES" SINCE 1888

MANUFACTURERS OF HEMCO PRODUCTS

NEW YORK
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CHICAGO
944 West Adams Street

SAN FRANCISCO
149 New Montgomery Street

December New Products

Magnetic Motor Starters

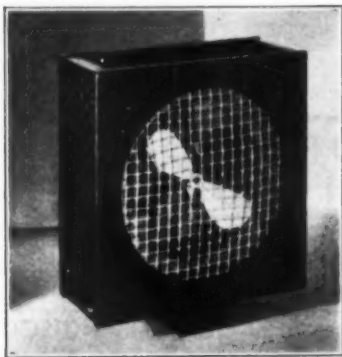
Type "MC" magnetic starters for motors up to $7\frac{1}{2}$ h.p., 25 amps. in single and polyphase 110, 220, 440, 550 volts, 25, 40, 50 and 60 cycles, have been placed on the market by Arrow Electric Division of Arrow-Hart & Hegeman Electric Co., Hartford, Conn. Units are manufactured in two styles, local and remote control.



All switches indicate "on" and "off" and trip indicator shows until reset. Starters have no-voltage protection. If current fails, switch opens up and shuts off motor. After voltage returns it is necessary to press start button to start motor. Thermal heaters are calibrated in a wide range of sizes for all motors within rated capacity, which react on a bi-metallic thermostat giving positive trip action under sustained motor overload. Heaters are accessible on front of switch. One piece arc hood protects and encloses copper to copper self-adjusting contacts. Units are in standard gray enamel steel box, outside dimensions of which are $9\frac{1}{2}$ in. high, 6 in. wide and $3\frac{1}{2}$ in. deep.

Electric Unit Heaters

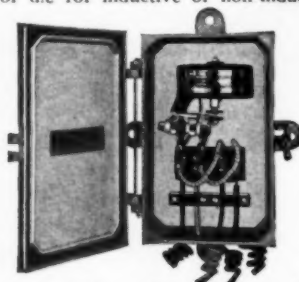
Edwin L. Wiegand Co., 7585 Thomas Blvd., Pittsburgh, Pa., announces Chromalox Heetflo electric unit heaters of the blower type in six standard sizes from 1.5 kw. to 4.5 kw. Unit has an automatic control and is equipped with thermal cutout that will automatically open heating circuit in case blower does not operate. Heater has angle iron mounting bolts for attaching unit to either wall or ceiling bracket. Heating elements of Chromalox units are



embedded in a refractory material under hydraulic pressure, and element is entirely encased in high temperature sheathing of chrome steel. Only one electrical connection is necessary at convenient outlet box provided at bottom of heater.

Mercury Tube Relay

Hart Manufacturing Co., Hartford, Conn., announces a No-arc mercury tube switch, made in single, double, triple and quadruple poles, each pole consisting of a mercury tube switch with ratings of 30 amp., 125 volts, 20 amp., 250 volts, either a.c. or d.c. for inductive or non-inductive



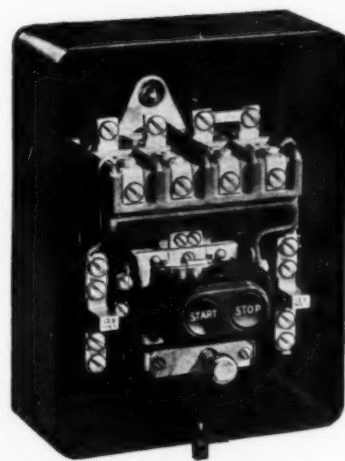
loads. Operating coils can be furnished for standard voltages up to 250 volts d.c. or 440 volts a.c. Also for low voltages of 6 volts d.c., 24 volts a.c. Units are mounted on non-combustible bases and in waterproof boxes. Because of the No-arc feature the manufacturer claims they are suited for locations where inflammable gases, dust and air conditions which make arcing dangerous, are prevalent.

Burglar Alarm System

The Guardian Electric Mfg. Co., Chicago, Ill., announces its line of closed circuit burglar alarm systems, completely wired to numbered terminals and suitable for all installations. A double closed circuit is employed and

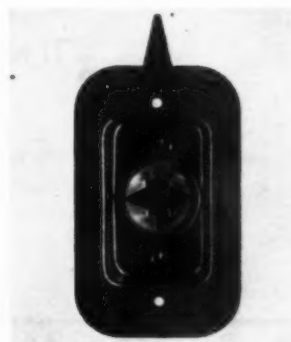


breaking, crossing or grounding of conductors initiates an alarm, which cannot be silenced except through the use of a key controlling circuit. Current is supplied by 8 dry cells from lower part of cabinet. Circuit draws but from $3\frac{1}{2}$ to 5 milliamperes and a meter registers current flow when system is set. Control cabinet is of No. 16 ga. steel; size $17\frac{3}{4}$ in. high, $13\frac{3}{4}$ in. wide, 6 $\frac{3}{4}$ in. deep, finished in dark green baked enamel. Outer gong housing is constructed of No. 12 ga. steel, inner housing is No. 16 ga. Outer cover is of interlocking type and held in position with 3 bolts, two of which are protected with tamper contacts. A "pry-off" tamper contact is also provided.



Starting Switch

A solenoid-operated across-the-line starting switch, rated at 5 h.p., 220 volt, $7\frac{1}{2}$ h.p., 440-550 volt for poly-phase motors, and up to $1\frac{1}{2}$ h.p., 110 volt; 3 h.p., 220 volt for single phase self-starting motors, is announced by Allen-Bradley Co., Milwaukee, Wis. Switch is made in three forms: Form 1, with start and stop push buttons; form 2, without push buttons, for thermostat or remote pilot control; form 3, with 2-way hand-automatic switch for "try-out" control installations. Unit has two Allen-Bradley resisto-therm relays with interchangeable thermal elements to provide overload protection. Arc hood and switch contacts are self-insulated. All switch parts are mounted on a metal back plate and switching units can be mounted singly or in gangs on machine frames or in metal cabinets. Rubber grommets between switch mechanism and base plate give full floating mounting.



Clock Hanger Outlet

A combination hanger and wall outlet for kitchen and other type wall clocks is being marketed by General Electric Co., Schenectady, N. Y. This hanger and outlet permits installation with no wires showing inasmuch as outlet is recessed into wall, behind clock and out of sight. It accommodates plug on clock cord and about 2 ft. of cord.

Electrical Contracting, December, 1933

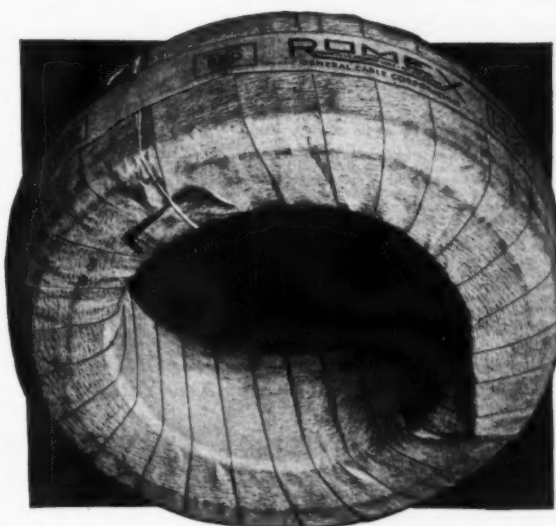
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NON-METALLIC SHEATHED CABLE

COVERED BY U. S. LETTERS PATENT AND PATENTS PENDING

- Tinned copper conductors, solid or stranded, depending on size.
- High grade Code rubber compound assures good dielectric and insulation strength.
- Paper threads braided with cotton assure a sturdy fibrous protection for the rubber on each conductor against injury or abrasion in outlet boxes.
- Multi-folded paper tape, provides a cushion over each individual conductor as well as a further protection against mechanical injury.
- Fillers (protected against moisture absorption) fill the valleys between conductors, and serve as a RIP CORD in stripping off the outer jacket.
- Tough outer braid provides an over coat capable of withstanding pulling—in stresses and external abrasion.



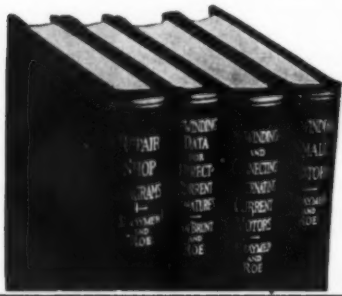
Its use makes a substantial saving in the man-hours required on roughing-in, or on finished house work. Easier to lift and lug! Easier to fish; and its greater flexibility counts in close-quarter work . . . Easier to strip; pliers and knife are all that's needed . . . Stocked by electrical wholesalers.



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ELECTRIC MOTOR
REPAIR LIBRARY
tells how to handle all kinds
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Do you know how to:

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- determine how many coils can safely be cut out
- lay out single-phase fan motor windings
- change single-phase windings for two- or three-phase operation
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THIS set of books should be on the shelf of every man who ever has to touch a motor for purposes of repairing it or changing it to meet different operating conditions. In shop language and with practical shop methods it covers every step in stripping, rewinding and connecting a.c. and d.c. motors of all kinds.

**How to change motors for different
 operating conditions**

Here is all the information you need in order to determine what changes various types of motors permit; to lay out new windings for specified service conditions; and to handle every step in the work with satisfactory results.

Covers all types of motors, from those used in small household and commercial appliances of all kinds, to mining and railway motors. Explains principles underlying the different types of windings; gives definite instructions for doing the various rewinding jobs. Also gives many data, tables and diagrams constantly needed by the repair man, including data difficult to get from any other source.

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The engineering department of the company has also prepared an application chart showing twenty-nine different types of electric motors and listing the proper motor for fifty different standard applications. A copy may be had gratis by writing to the Advertising Department, The Louis Allis Co., 427 E. Stewart St., Milwaukee, Wis.

Catalog No. 833 covering Ilg Universal blowers has just been published by Ilg Electric Ventilating Co., Chicago. This is a 40-page book covering Type "B" direct connected universal blower, type "B" belted universal blower, direct connected pressure blower, type "P" blower, type "V" blower and marine blower. The book contains illustrations of the units, lists of capacities and dimensions, motors, construction diagrams and general data. In addition two pages are devoted to photographs of prominent buildings where Ilg blowers are installed.

Westinghouse Electric & Manufacturing Company, and subsidiaries, announce the removal of its New York executive and sales offices to the RCA Building, 30 Rockefeller Plaza, New York City.

Crouse-Hinds Co., Syracuse, N. Y., has issued Bulletin 2265, dated October 1, 1933, covering Obround Condulets for threaded and threadless conduits. The booklet contains illustrations of each unit, as well as style of conduit, catalog number and price-list.

**LOUIS ALLIS ANNOUNCES NEW
 SALES REPRESENTATIVES**

The Louis Allis Co., Milwaukee, Wis., announces the appointment of four new members to its sales organization as follows:

C. F. Cate, 212 North 3rd St., Albuquerque, N. M., has been appointed representative for the state of New Mexico.

Robert B. Soderberg will represent the company in the state of Connecticut with headquarters at 196 Palm St., Hartford, Conn.

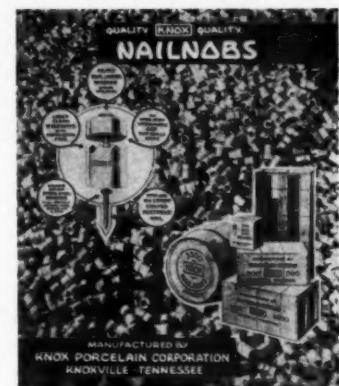
N. O. Sawyer has joined the sales organization working out of the company's New York office located at Room 385, 50 Church St., New York.

G. W. Conner has joined forces with the Cincinnati office located at 1124 Chamber of Commerce Building.

SPECIFY
"Latrobe"

FLOOR BOXES—ACCESSORIES
 "BULL DOG" INSULATOR SUPPORTS
 "KEYSTONE" FISHWIRE
 CONDUIT BENDERS

All manufactured by Fullman
 Mfg. Co. and carried in stock
 by over 300 jobbers—Send for
 Catalog No. 325.
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 Constant Level Oilers

**Simplify
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By keeping oil at just the right level, automatically, SpeedWay Oilers end over-oiling and under-oiling, stop oil dripping and most motor troubles. Large visible oil supply cuts oiling time to a fraction. They are profitable to everyone—to contractor, maintenance man, to plant owner. End waste and needless expense. Pay for them in oil savings alone.

Write for SpeedWay Manufacturing Co.
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**"Standardise on
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 Transformers"**

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ALL TYPES
 Indoor and
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 •
 Send for
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 Bulletin
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STANDARD TRANSFORMER CO.
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602-d. Single conductor Type R wires, unless provided with a lead sheath, shall be covered for their entire length with a braid which is both flame-retarding and moisture-resisting.

**To MEET *this*
NEW CLAUSE in
the 1933 NATIONAL
ELECTRICAL CODE
*insist upon . . .***

U. S.

1,635,829
1,772,436
1,765,000



WIRE

1,798,486
1,410,790
1,536,549

MADE IN ALL SIZES, IN COLORS FOR CIR-
CUIT IDENTIFICATION... "SLICK" FINISH
FOR EASY PULLING. MADE BY THE
WORLD'S LARGEST PRODUCER OF RUBBER.



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SHERMAN SPLICING SLEEVES



Three Styles—

- Tinned Splicing Sleeves (Split Connector) Illustrated
- Figure Eight Double Tube Sleeves
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These cover practically all Splicing Sleeve requirements

Made of only the highest quality of pure copper to the exact dimensions specified

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680 Quality Items

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HANGERS FOR CABLES & CONDUITS

Easily the best for quick, low-cost installation work. Send for full details and costs.

1 Hanger without Porcelain Bushing. Spring steel; stronger, quicker, more compactly arranged.

2 Hanger attached to steel beam with bolt and nut.

3 Jiffy Clip—quicker, neater work at less cost.

4 Cable Joint or Pull-head Compound—8 grades for every system, underground or overhead.



JIFFY CLIPS



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WHERE **QUALITY** COUNTS



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is used

THE tensile strength of Plymouth Tapes exceeds specifications of both the U.S. Government and the American Society for Testing Materials (A.S.T.M.).



These two specifications require a tensile strength for tape of forty pounds per inch of width. Plymouth Tapes always have a tensile strength of not less than forty-five pounds per inch of width.

A guaranteed excess of five pounds per inch of width is a real excess. It proves that Plymouth Tapes are made of only the finest fabric and it further proves that Plymouth Tapes will not and cannot break off or tear easily.

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PLYMOUTH RUBBER COMPANY, Inc.
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3 COLORED INSULATIONS
Identify the Grade

8 COLORED BRAIDS
Simplify Circuit Testing

USE G-E
"Safecote"
Flame-Retarding Finish



General Electric Code Wires eliminate the guesswork in wiring. Insulation in three colors identifies the grade, (Black identifies Code; Red, Intermediate and Green, 30%). Self-identifying braids in eight colors make circuit-testing easy.

In addition, Safecote Flame-retarding Finish provides protection against moisture and fire hazards. Diameters are uniformly small. The maximum number of wires per conduit may be used. Braids are tough and smooth-finished for easy pulling.

Your nearest G-E Distributor will gladly supply your requirements or write to Section DW-2012, Merchandise Department, General Electric Company, Bridgeport, Conn.

CODE WIRES



WIRING MATERIALS FOR CHRISTMAS LIGHTING

Now is the time to line up your local municipal government, stores, banks, schools, churches, lodges, office buildings, industrial plants and homes for Christmas Lighting. Christmas Lighting is an investment in community good-will . . . a display of Christmas cheer. It offers you profitable business for the between-season period.

General Electric stands ready to supply your requirements for reliable weatherproof sockets, outlets, cord sets, and other wiring needs. For prompt service, telephone your nearest G-E Merchandise distributor or write for information to Section DW-2012, Merchandise Department, General Electric Co., Bridgeport, Conn.



WIRING DEVICES

GENERAL ELECTRIC

MERCHANDISE DEPARTMENT, GENERAL ELECTRIC COMPANY, BRIDGEPORT, CONNECTICUT

